Spirit of New England and Foundrymen's Convention Issue

THE IRON TRADE REVIEW

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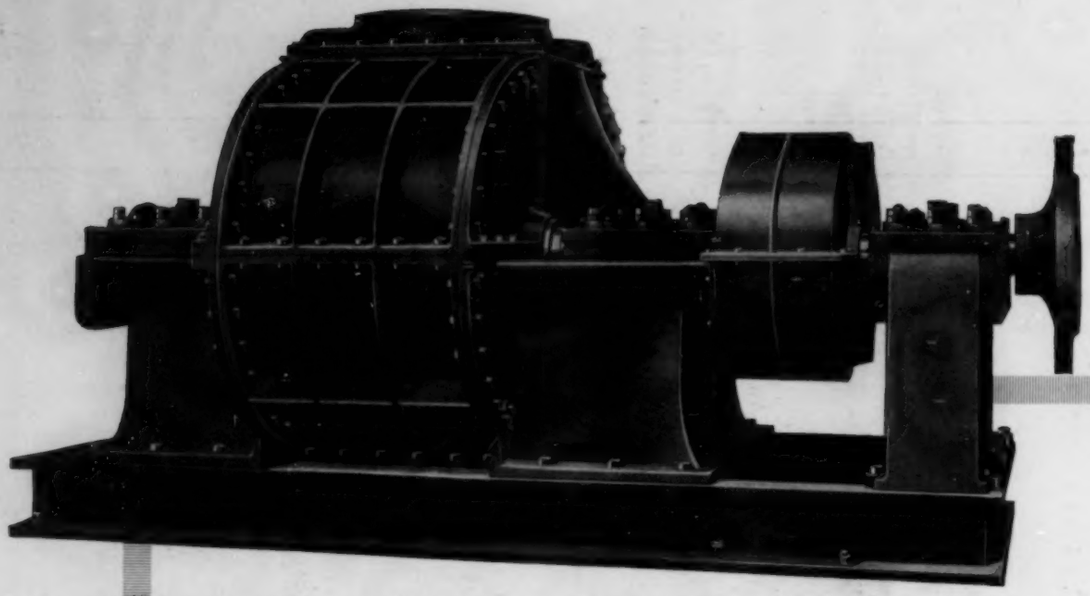

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The Spirit of New England

In Peace or War A Nation's Bulwark

INDUSTRIALLY, the story of New England is the story of the nation. Secure in their proud position in the political evolution of the United States, the commonwealths that sprang from Plymouth Rock likewise have supplied the foundation and the substance of the country's leadership of the world in manufacturing enterprise. In the development of these pioneer settlements in mechanical and productive greatness may be traced closely the commercial extension and growth of the whole country. From them largely have come the genius of invention and the skill of workmanship which, with the passing of years, have been applied effectively to the advancement of the general welfare of the nation.

The fierce flame of independence of thought and action which fired the souls of those seeking individual liberty for themselves and their posterity in a new world, is the spirit that has made New England great industrially. It has created a religion of self-reliance which, recognizing its own power, has bent natural resources to its bidding; it has transformed trackless forests into fertile fields; small shops into powerful industries; struggling settlements into great and thriving cities and isolated communities into a peerless nation. A leader in the useful arts of peace, New England's services to its country in the crucial hour of war equally have been a powerful factor of firm reliance and of strength. The fine fiber of courage and of loyal appreciation of duty, tested and strengthened by the fire of conflicts in years long past, has given itself again to the struggle for world advancement and for civilization. Today the memories of Lexington and of Bunker Hill are the inspiration of the producers of shells, guns, aeroplanes and of the thousand and one products of mechanical skill for the battlefields of France. In the skill of artisanship, the genius of management, and the swiftness of production, and withal, the complete answer to the country's call may be traced a dominant, vitalizing force—the reason for it all. It is the imperishable heritage of the Pilgrim forefathers—the Spirit of New England.

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New England Rises to Call of War

Leaders of Many Industries Direct Energies to Equipping Army and Navy for Service—New England Leads Nation in Diversity of Articles Produced for Government's War Chest

BY E. L. SHANER

WHAT is the spirit of New England?

Ask the average American whose haunt is west of Mineola and Plattsburg and he will answer, "Conservatism."

Gradually, and with a certain degree of justification, the people of 43 states have gained the idea that the six easternmost commonwealths hold a proud monopoly on everything that suggests reserve, retirement, and self-complacency. In the public mind, conservatism has become as much a handicap to New England as lynchings to Georgia, or LaFollette to Wisconsin.

Burdened with the stigma of such a reputation, New Englanders, never having practiced press agent tactics on their own behalf, have been content to allow the charge of conservatism to go unchallenged. In fact, it is easy to believe that many persons on the east coast, who have basked in the fond memories of New England's achievements in colonial and revolutionary times, are satisfied with the characterization. It is because of this willingness to allow present impressions to stand uncorrected, that a mere midwesterner has gone into the very heart of New England to seek out and define the real spirit existing there.

To an outsider, especially one who previously had judged industrial activity by the number of lighted stacks in the Mahoning valley, or inversely by the number of idle mills around Gary or Homestead, New England presents a deceiving appearance. The mills and factories of Massachusetts, Rhode Island and Connecticut, are picturesque, and grind out their product without the accompaniment of the noise and smoke characteristic of the Pennsylvania, Ohio and Illinois plants. Youngstown and Johnstown speak of products in terms of tons; Waterbury and New Britain in dozens and gross. The earmarks of industry on the Connecticut and Blackstone are mill ponds and vine-covered buildings; on the Monongahela and Shenango, belching smokestacks and bare materialistic structures. The casual observer in New England sees little of what is taking place inside the picturesque walls of its factories.

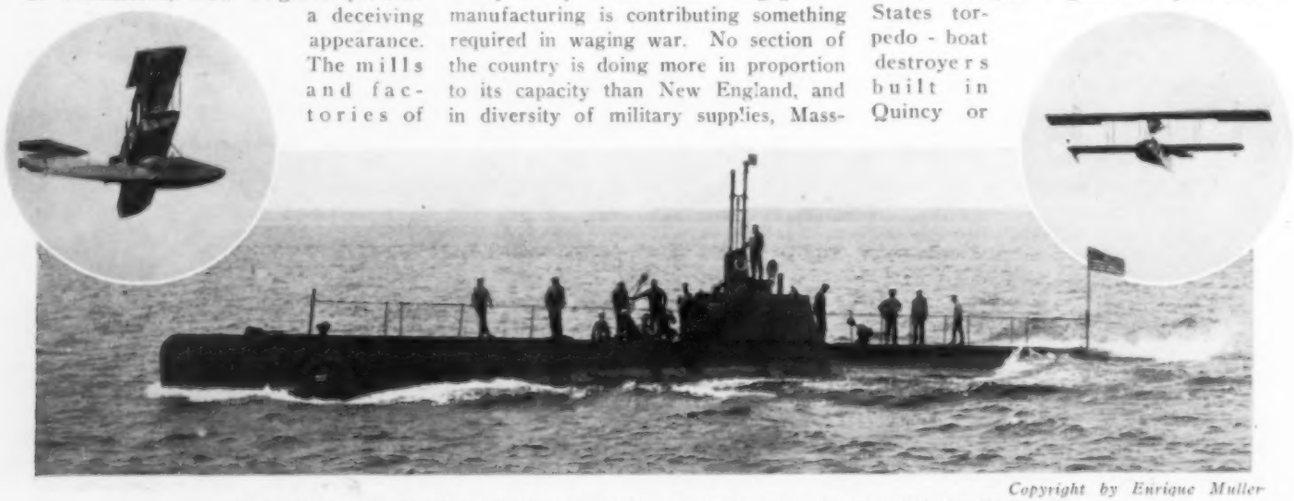
LEARNING TO OPERATE A MACHINE GUN—A "TRENCH EVACUATOR" MADE IN NEW ENGLAND

With very little surface disturbance, New England's spirit has re-awakened to the appeal of national peril. Practically every establishment engaged in manufacturing is contributing something required in waging war. No section of the country is doing more in proportion to its capacity than New England, and in diversity of military supplies, Massachusetts, Rhode Island and Connecticut far excel all other states of the nation combined.

In order to gain a clear idea of the truthfulness of this statement, one has only to take inventory of the equipment used by Uncle Sam's fighting men. Soon after the raw recruits run the gauntlet of physical examination, they don khaki woven in the Blackstone valley of Rhode Island. Their hats are from Danbury and their shoes from a Lynn or Brocton factory. While gaining proficiency in the manual of arms, they become intimately acquainted with a rifle made in Hartford or New Haven. Round after round of Bridgeport ammunition is consumed in developing their skill on the rifle range.

In small arms drill, the officers learn the trick of neatly sheathing a New England-forged saber in a Massachusetts-pressed scabbard. They must also acquire accuracy in the use of a 45-caliber Colt—made in Connecticut.

The drafted men in the cantonments at Ayer, Chillicothe, Yaphank, etc., rest their weary bones on beds whose blankets came from Pawtucket or Blackstone. The wire springs are Worcester products. In the commissary department, the clatter of New Britain kitchen utensils proclaims the activity of the cooks, who prepare the army rations on Watertown stoves. In the mess rooms, hungry soldiers thrice daily attack the food with Meriden or Torrington knives, forks and spoons. Army transports, guarded by United States torpedo-boat destroyers built in Quincy or



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NEW ENGLAND PRODUCTS ARE HELPING UNCLE SAM ON SEA AND IN THE AIR

Bath, carry the "Sammies" to Europe. Once on French soil, the soldiers discard their Danbury sombreros and don steel helmets made in Fitchburg.

New England products will play their most important role when the American forces commence actual fighting at the battlefront. Yankees, piloting military planes of Jamaica Plains or Marblehead manufacture, may drop bombs on the Krupp works. Lewis machine guns, made in New Haven or Hartford, may rake the German trenches with unfriendly Bridgeport bullets. The barrage fire of shrapnel issuing from Waterbury cartridge cases, may precede the American troops in their forward march through no man's land.

While the khaki-clad men are training in American camps, or chasing the Hun in Europe, their friends at home will be offering encouragement in letters written with Connecticut pens on Massachusetts or Maine paper. Moreover, the wool yarn, which already has turned every hotel lobby into an impromptu knitting room and which in its ultimate form is intended to keep the soldiers' feet, hands or chests warm, came from a New England mill. Add to this list of New England-made articles, merchant ships, battle ships, submarines, anti-air-craft guns, and countless other items, and even the most skeptical must admit that the six states east of the Hudson are doing their share in equipping the nation's naval and military forces.

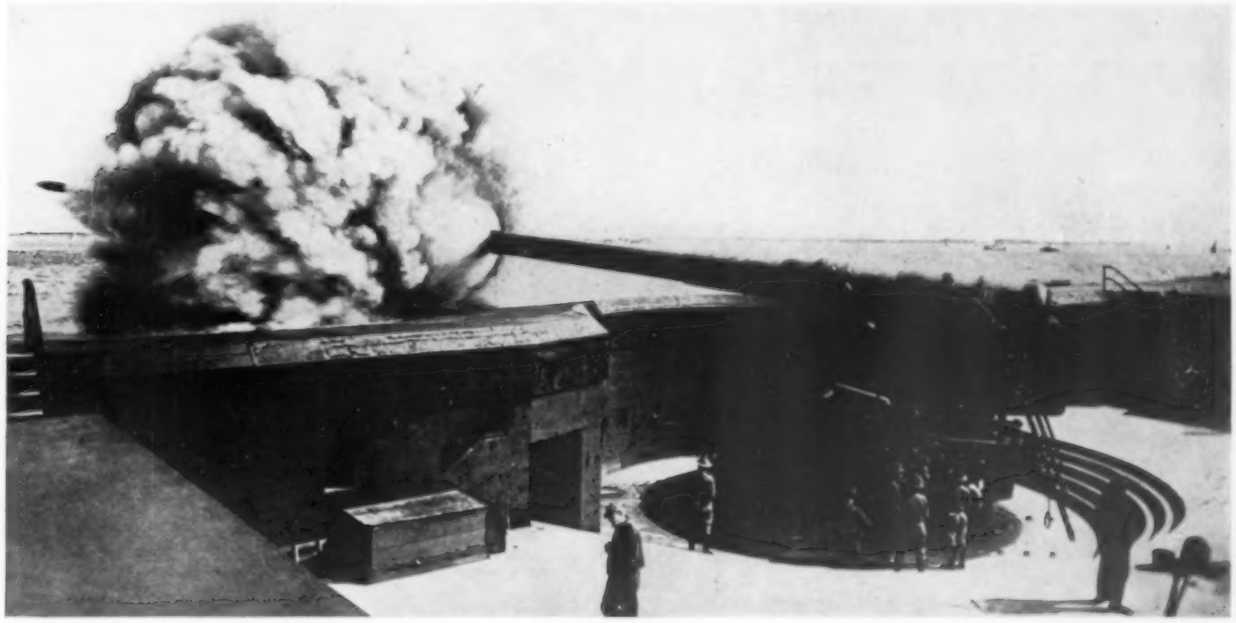
It may be interesting to know how it happens that New England was prepared to accept such a heavy burden of government work in the present emergency. To thoroughly understand this, one must go back to New England's earliest history and trace the development of its industries. In the pre-revolutionary period, the sea-coast towns of Massachusetts and Connecticut comprised the workshop of the colonies. From the then small industries of such towns as Boston, Taunton, Bridgewater and Hartford came all the supplies for the 13 provinces. The first foundries, forge shops, furnaces, and machine shops were erected in or near these settlements, and as the growing colonies required more tools and manufactured articles, the industries expanded to meet the demand. At one time, Salisbury, Conn., held promise of becoming the Birmingham of America on account of its leadership in producing pig iron. Early in colonial history, Connecticut acquired a reputation for the ability to manufacture small articles for household use. The foundations of many of the present industries of that state were laid years ago, when Yankee ingenuity was displayed in watch-making, the forming of kitchen utensils, edge tools, etc.

After the revolutionary war, the rapid exodus of New England settlers to western states wrought changes in the industrial development. Connecticut lost its grip on the iron industry when cheap coal and better ore was found in Pennsylvania and Minnesota. However, the skill of Yankee artisans gave New England a hold on the manufacture of fine instruments and edge tools which never has been broken. Therefore, while articles requiring vast quantities of bulky raw material are now made in the extensive plants of Pennsylvania, Ohio, Illinois, and other states better situated for this purpose, small articles requiring considerable skill and accuracy in their fabrication, are produced in New England factories. Among the most important products of Massachusetts, New Hampshire, Vermont, Maine, Rhode Island and Connecticut are boots and shoes, cotton and woolen goods, hardware, small hand tools, machine tools, electrical machinery, brass goods, small arms and ammunition, silverware, watches and jewelry.

The dependency of the textile industry upon the manufacturers of cloth-making machinery was clearly revealed by an officer of one of the large textile machinery companies in Rhode Island. When asked if the war had affected his business, his reply was a prompt and emphatic, "Certainly."

"These numbers," he continued, pointing to a list of some 10 or 12 entries, "represent requisitions for textile machinery for plants engaged in government work. These orders take precedence over everything on our books. It will require 40 per cent of our capacity for three months to complete the work specified on those requisitions."

Further questioning revealed the fact that the machines were for textile plants holding large orders for khaki for uniforms and cloth for bandages. When a person remembers that this textile machinery company is a heavy



EVEN THE HEAVIEST MILITARY EQUIPMENT OWES SOMETHING TO NEW ENGLAND—MACHINE TOOLS FROM NEW ENGLAND MACHINED THIS GUN, AND NEW ENGLAND-MADE ACCESSORIES CONSTITUTE ITS EQUIPMENT

purchaser of pig iron, the connection between the textile and iron industries becomes readily apparent.

New England states stand high in the manufacture of machine tools and machinery. One writer has claimed that more high-grade machinery is manufactured within a radius of 10 miles of Worcester, Mass., than in any similar area in the world. Whether or not this statement is strictly true, the fact remains that Worcester, Springfield, Hartford, New Britain, Providence, New Haven and Boston are the homes of some of the most widely known machine tools used in the metal industries. Most of the firms engaged in this business were established many years ago, and have slowly increased their capacities to keep pace with the growing demand for their products. The requirements in castings for machine tools prompted foundrymen to cater to the machine tool trade, and while many of the tool builders own and operate foundries in connection with their machine shops, hundreds of small foundries throughout New England are engaged in jobbing work for the machine manufacturers. So inseparable have the machine shop and foundry industries become, that it is difficult to draw a line of distinction between the two.

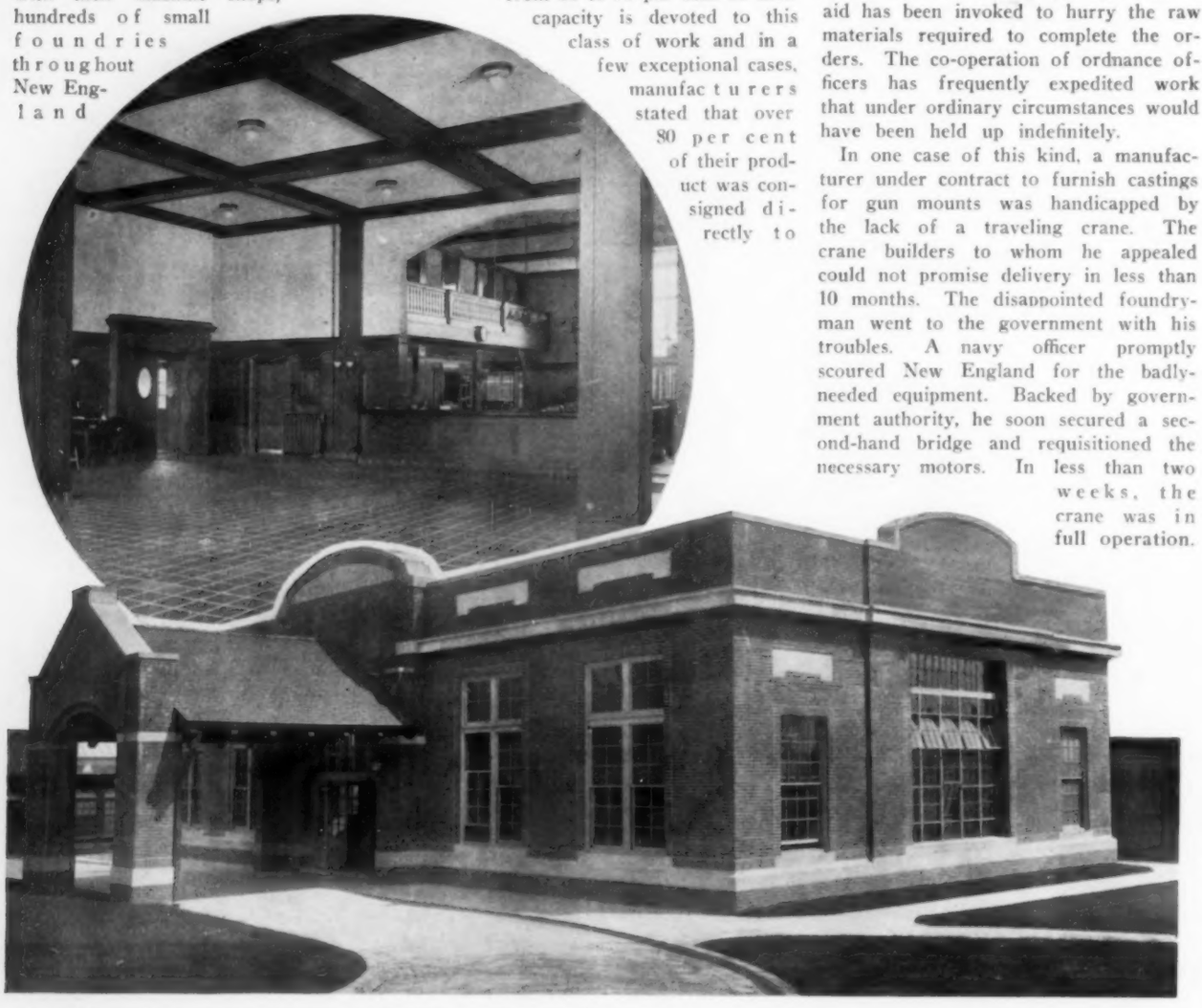
Previous to the entrance of the United States in the war, the capacity of New England machine tool plants was taxed by export orders. Factories which had not been operating at full capacity for some time resumed operations at full blast, and a number of companies made hurried extensions to their works. The export business has now receded to some extent, and many of the firms are devoting their attention to United States government work and to orders for companies engaged in making war materials. In a canvass covering the principal machine tool builders of New England, only one manufacturer reported less than 25 per cent of his plant's capacity engaged on work direct or indirectly traceable to the war. The majority of tool builders claim that from 50 to 75 per cent of their capacity is devoted to this class of work and in a few exceptional cases, manufacturers stated that over 80 per cent of their product was consigned directly to the government or to firms making war materials for the government. These estimates, furnished by responsible men, indicate the surprising extent to which New England has quietly but effectively entered into the spirit of war.

New England tool builders are making many machines for the government arsenals and navy yards. Frequently the visitor in the offices of a machine tool company finds himself in line with army or navy inspectors. These uniformed men are constantly in touch with the manufacturers who hold government contracts, urging more speed on delayed orders, or checking finished tools with specifications. Happy is the machine builder whose product receives the stamp of government approval:

Inspected by .....
U. S. Quartermaster's Department
Inspection does not necessarily mean acceptance.

Lathes, drills and boring mills have been purchased in large quantities by the United States. Orders for these machines involve prompt delivery, and in a number of instances government aid has been invoked to hurry the raw materials required to complete the orders. The co-operation of ordnance officers has frequently expedited work that under ordinary circumstances would have been held up indefinitely.

In one case of this kind, a manufacturer under contract to furnish castings for gun mounts was handicapped by the lack of a traveling crane. The crane builders to whom he appealed could not promise delivery in less than 10 months. The disappointed foundryman went to the government with his troubles. A navy officer promptly scoured New England for the badly-needed equipment. Backed by government authority, he soon secured a second-hand bridge and requisitioned the necessary motors. In less than two weeks, the crane was in full operation.



THE DINGY OFFICES OF THE PAST ARE FAST BEING REPLACED BY MODERN STRUCTURES—THE FOUNDRY SUPERINTENDENT'S OFFICE SHOWN ABOVE, MARKS A NEW ERA IN OFFICE DESIGN

TYPICAL INDUSTRIAL BUILDINGS RECENTLY BUILT IN NEW ENGLAND

The munitions contracts held by the machine tool builders indirectly provide for a great many smaller manufacturing plants. Take the case of a company specializing on engine lathes. Although the foundry department makes certain castings required in building these machines, it has been necessary to purchase many cast parts from jobbing foundries. The gray-iron work is distributed among no less than four different casting plants, and the brass boxes and bushings are obtained from three brass foundries. Therefore a single government order for lathes affects at least eight manufacturers, all of whom must co-operate to insure the prompt delivery of the finished product.

One of the most interesting developments in the foundry industry in New England is the rapidity with which a Hartford electric steel casting plant was swept into the whirl of government work. This particular foundry was designed and constructed by the Connecticut Electric Steel Co., Inc., to make small electric steel castings for a well known Connecticut manufacturer. The new plant had scarcely begun operations before it was offered an opportunity to make a considerable quantity of steel castings for naval gun mounts and truck mounts for anti-aircraft guns. The concern quickly altered its plans to accommodate this government work, and for the past few months has been devoting the entire capacity of the shop to gun-mount castings. Moreover, the company has proceeded with arrangements to double the size of the foundry, and will soon install a second heroult furnace to supplement the one now in operation. The diversion of this plant from its intended purpose to government work has prompted the company which originally had expected to use the castings to consider the installation of an electric furnace for its own needs. Thus the war may be indirectly the cause of an expansion of the electric steel industry in New England.

Many New England manufacturers have been quick to enter new fields in order to serve the government. The B. F. Sturtevant Co., Hyde Park, Mass., is generally known as a maker of fans and exhaust systems. Today, a visitor to the Sturtevant plant is greeted with the whir of aeroplane propellors used in testing aeronautical motors said to average 3.4 pounds per horsepower. The General Electric Co., Lynn., Mass., has adapted a generous proportion of its vast resources to government work. The Simonds Mfg. Co., Fitchburg, Mass., which for 85 years has been engaged in the peaceful business of saw and file making, has undertaken a large contract for steel helmets. The Wyman-Gordon Co., Worcester, Mass., since 1883 has been acquiring a reputation for heat treated forgings. Its experience in this business enabled the company to divert part of its resources to the manufacture of crank shafts for military aeroplanes. The list of New England manufacturers who have responded to the call of preparedness in a similar manner would contain the names of hundreds of firms whose product is known the world over.

The brass goods industry, whose activities are almost entirely confined to the limits of New England, is contributing to the nation's war chest to an extent little realized by the general public. Waterbury, Conn., which claims in its slogan to have "something on everybody," is the home of the principal brass manufacturing plants in the country. It is in these factories, employing approximately 30,000 men and women, that most of the brass for cartridge cases is made. The product of these plants also takes the form of countless articles necessary in the manufacture of war materials, including parts for range finders, tubing for shrapnel, seamless brass and copper parts, etc.

It is interesting, in passing, to consider the early growth of the brass industry. Brass in America first came into use as a substitute for the rude tinware which Yankee peddlers collected in Connecticut workshops and distributed to the far corners of the United States. At about the same time it was discovered that sheet brass, when cut into the proper shape, made better and cheaper parts for clocks than wood. Therefore, whereas in 1800, a shrewd Yankee peddler could dispose of a wooden clock in the wilds of Louisiana for $100, in 1830, the high price for better clocks of brass was about $10. Brass was soon used for buttons, pins, wire and tubing, and gradually became one of Connecticut's most important products.

While the method employed by the

Yankee tinware peddlers brought them into bad repute, the United States is indebted to them for paving the way for the present system of distributing merchandise. William and Edward Pattison, the original peddlers, made household articles in their Connecticut home, and traveled on foot, selling their wares from house to house. As business developed, they distributed the goods by horseback, and finally from wagons. Later, instead of starting each trip from the Connecticut headquarters, they established storage places in various central points, thus enabling the peddlers to radiate from each central point to the surrounding towns. As the railroads developed, the transportation of goods to the distributing centers became a simpler proposition, and before the peddler system went out of vogue, a method of distribution reaching into every corner of the nation had been established.

A YANKEE CLIPPER—BUILT IN THE PALMY DAYS OF NEW ENGLAND SHIPBUILDING

Thus to the cunning Yankee, with his red wagon and shining wares, are due the thanks of the commercial world for its present system of warehouse distribution.

The New Role of Wire

Although it is impossible to make definite statements regarding the activity of the Worcester and New Haven plants of the American Steel & Wire Co., it is known that considerable government work is being handled. It is thought that the new rope mill soon to be built at the New Haven works, is the outcome of government demand for wire cable. Germany's method of conducting submarine warfare has created a need of heavy wire nets, and New England's facilities for meeting these requirements are especially valuable at this time. Worcester, and a number of smaller towns in western Massachusetts, have become the homes of a dozen or more plants specializing in wire products, many of which are used in modern warfare. Wire cots for cantonments, springs for guns, coiled wire for various purposes, and barbed wire for entanglements are the products of such companies as the American Steel & Wire Co., the Wright Wire Co., the Morgan Spring Co., and others.

Production of Munitions

Perhaps New England's greatest activities in producing war goods are in the manufacture of small arms, ammunition and rapid-fire guns. Although it is exceedingly difficult to even roughly estimate the volume of government work performed in the plants of the Marlin-Rockwell Co., New Haven; Remington-U. M. C. Co., Bridgeport; Winchester Arms Co., New Haven; Iver Johnson's Arms & Cycle Works, Fitchburg, Mass.; Smith & Wesson Associates, Springfield, Mass.; Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.; and other smaller concerns, it is known that considerable United States work is being done in addition to that for foreign governments. Among the latest munitions contracts given to New England firms by the government are those for Browning rapid-fire guns. The Marlin-Rockwell company is understood to have a contract for 20,000 of these guns, and the Remington U. M. C. and Winchester companies are said to have received similar orders. It is significant that

New England is also making an enviable record in constructing ships for the emergency fleet. The activity of the seacoast towns of Maine, Massachusetts, Rhode Island and Connecticut in this respect must bring a thrill of pleasure to persons who recall the time when New England-made ships carried a creditable share of the world's tonnage. In those days, the trim clippers, under the direction of Yankee skippers, carried the United States flag to every part of the globe, and earned universal respect for America's merchant marine. Now, in sharp contrast to the period of idleness which followed the heyday of American shipping, the yards on the east coast are again the scenes of activity.

The Gildersleeve Ship Building Co., at Gildersleeve, Conn., on the Connecticut, has laid the ways for keels of two wooden ships for the government. These ships are to conform to the standard specifications of the shipping board and are to be delivered at a contract price of about $300,000 per hull. Ships have been built at the Gildersleeve yard since 1821. The gunboat CAYUGA, which rendered distinguished service in Admiral Farragut's fleet at New Orleans, was built in this yard. During recent years, the company has devoted its attention to the construction of coal barges, from eight to 12 being turned out each year. This yard is only one of the many New England shipbuilding plants which have sprung up in response to the cry for ships.

Of course the largest percentage of shipbuilding in New England is in progress in yards which were active even during the slump in merchant ship construction. The Bath Iron Works, Bath, Me., and the Fore River Ship Building Corp., Quincy, Mass., have been building ships for the United States and other navies, and for private concerns for many years. New England has taken a prominent position in the building of submarines for the Uuited States navy.

The Transportation Situation

A review of the industrial conditions now prevailing in New England would not be complete without some mention of the transportation situation. New England, unlike other sections of the country, is thickly populated, its cities and towns being distributed over a comparatively small area. The freight hauls are necessarily short and the interchange of freight from one car to another and of cars from one train to another is frequent. Moreover, the movement of freight trains must be controlled so it will not interfere in any way with the heavy passenger traffic, which is perhaps as complex in New England as in any other part of the country. During the past few winters when the traffic situation in all parts of the United States was anything but satisfactory, the conditions in New England were extremely serious. Manufacturers dependent upon the railroads of New England for their transportation service hail with delight the recent announcement of the New York, New Haven & Hartford railroad that it will build a large classification yard north of New Haven. As announced by the railroad company, the plans call for a yard which, when completed early

in 1918, will be the largest in New England and will rank among the large railroad yards of the country. Situated at New Haven, which is central to all of the industrial centers of New England, this yard will offer facilities for making up freight trains for practically every large town in New England. This will enable the smaller yards which are distributed over the southern part of New England to be relieved of much of the work which has congested them during the past two or three years.

Averting a Fuel Famine

Accompanying the transportation difficulties has been the constant threat of a serious coal shortage. New Englanders are making a strong effort to anticipate a fuel famine this winter by laying in stores of coal before the railroads become entangled in the annual freight tie-up. A few companies have been able to hurriedly construct storage bins for emergency supplies, but in the majority of cases, coal has been unloaded on the ground where in its unprotected condition it is subject to deterioration by the elements and spontaneous combustion from within. A few of the manufacturers have learned to guard against the latter contingency by sinking a 2-inch pipe into the coal piles, enabling an attendant to take occasional readings of the temperature of the coal by lowering a thermometer in the pipes. The approach of the temperature to the century mark, is a warning that the fuel must be moved to forestall a conflagration.

The activity of the various industries as outlined above indicates that in spite of the charge of conservatism made against New Englanders, they are engaged in doing important work to assist the government in waging war. Having agreed that New Englanders have been prompt to enter into the spirit of war preparation full heartedly, we can now spend some time investigating the charge of conservatism.

Unfortunately the public in passing judgment on the qualities of men, allows the unfavorable impressions to gain prominence over the favorable. Thus the visitor in New England who encounters a reserved, nonprogressive manufacturer of the old school, is apt to conclude he is one of many such men rather than an exception.

A man of this type operates a small foundry in a Connecticut town. He has made castings for a number of prominent machine tool builders for over 30 years. Not long ago, the purchasing agent of one of these firms asked the foundryman to make a dozen castings from a new pattern. Although comparatively simple, the job differed to a slight degree from the general character of the work which regularly passed through the shop. After some discussion, the proprietor of the foundry refused the order.

A witness to the incident was curious to know why the job, involving no appreciable difficulties, had been turned down, especially since it had been offered by a customer of 30 years' standing. He asked the foundryman why he had refused the order.

"Why," said the New Englander in surprise, "I have never tackled a job of that kind in my life. I would have to make new flasks and show one of the molders how to make the mold. I'd rather stick to the old work."

"Yes, but aren't you eager to develop your shop to take in new jobs that are profitable?" queried the visitor.

"Oh, I don't know about that. You see I have had the same work from the same customers for more than 30 years. I'd hate to go into something new. It would mean a lot of changes. Anyway, I have enough work now. Why should I try to take more?"

It is from such men that New England gains its atmosphere of conservatism. Fortunately, progressives are rapidly out-marching men of the kind just cited. The following incident indicates a spirit of aggressiveness typical of New England business men of the new school.

Averting a Shut-Down

A jackshaft in the power plant of a large Connecticut manufacturing plant broke squarely in two late one Friday afternoon. The accident was promptly reported to the president. He summoned the chief draftsman who brought blue prints of the shaft that failed. The specifications were hurriedly noted. In a few minutes the wires were carrying descriptions of the required forging to every likely forge or machine shop within a radius of 100 miles. In a few hours a Bridgeport repair shop reported that it could supply a forging of the proper dimensions. A Waterbury machine shop in the meantime had promised to machine a forging in five days. This was not fast enough for the president. He wired to other machine shops. Finally a Bridgeport machinist offered to finish the forging in 48 hours, working night and day. Orders were given to send the forging to this machine shop.

Charters Special Train

While the forging was being turned down to dimensions, the president appealed to local officers of the New York, New Haven & Hartford railroad to move the shaft as soon as it was finished. Not satisfied with the indefinite promises given, he went to the main offices of the railroad company. Failing to arrange satisfactory shipment on the regular freight or express trains, he chartered a special train.

When the finished jackshaft was released from the lathe centers, workmen were ready to hurry it onto a waiting flat car. The special train arrived at its destination in an unusually short time. The shaft was quickly lifted from the car and swung into place in the power house. It fitted the housings perfectly. Monday morning the plant was operating as if no breakdown had occurred. Certainly the man who took such drastic measures to avert a long shut down cannot be charged with conservatism.

Fortunately for New England, its big men of industry are veering away from the traditional reserve. The composite personality of today's successful New England business man is free of the severe coldness of the earlier type; it radiates courtesy; implies honesty; displays a fair degree of enthusiasm; and

(*Concluded on page* 98)

BATH AND QUINCY YARDS NOW TURN OUT MODERN MERCHANTMEN

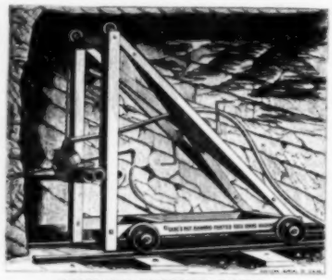
E. E. LAMSON, Treasurer. E. G. LAMSON, President.

THE WINDSOR MANUFACTURING CO.

WINDSOR, VERMONT.

DIAMOND POINTED DRILL.
With Single Oscillating Engine, for Small Tunnels, &c.

DIAMOND POINTED DRILL.
With Rotary Engine,
And Frame for Tunneling, &c.



DIAMOND POINTED DRILL.
With Rotary Engine and Frame for Large Tunnels, Mines, Pits, Open Cuts, &c.

This Cut represents a Gadding Machine with oscillating engine, driving two drills; designed especially for boring holes for splitting blocks of stone.

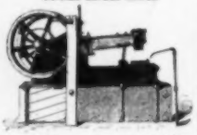
Points with Corkscrews or Rock Diamonds.

IRON PLANERS.

Length.	Planes in length.	Planes in width.	Planes in height.	Weight.	
5 feet	5 feet 9 inches.	30 inches.	30 inches.	3200	Extra Heavy.
6 "	6 " "	32 "	32 "	3800	
7 "	7 " "	34 "	34 "	4200	
8 "	8 " "	36 "	36 "	4600	Extra Heavy.

The gears are all cut. Cross screws of best steel. Heads graduated to 45 degrees. Doors, cross and angular heads independent.

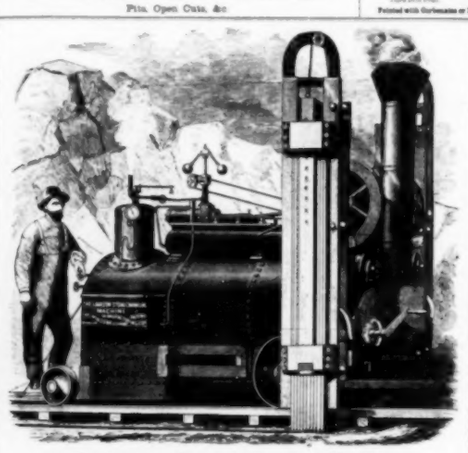
Small Trip Hammer,
With Iron Bed.



Length of Bed, ... 4½ feet.
Weight, ... 2550 lbs.

ENGINE LATHE,
With Back Screw Gear.

Swing, ... 13½ inches.
Length of Bed, ... 4½ feet.



The Lamson Stone Channeling Machine.

For Quarrying Marble, Slate, Sandstone and Grindstone rock; for Sinking Shafts in Mines and Tunnels, and for Grooving the sewall Pavements of City Streets. Manufactured by the Windsor Manufacturing Company, of Windsor Vermont.

Has cut from 75 to 150 square feet of channel per day, saving the labor of from seventy to eighty men. Can be seen running in the quarries of Barre, Sheldon & Hinsdill, the Green Mountain Marble Co., the Pittsford Quarry Co., Brown, Clement, Parker & Gibson, and others in and near Bethel, Vermont, or at the works of the Company at Windsor, Vermont. For Circular, descriptions, prices, &c., address the Windsor Manufacturing Co., Windsor, Vermont.

PATENT COMBINATION
Screw and Griping Wrench.

The advantages claimed for this, over all other Screw Wrenches, are
1st. It turns round or worn nut nuts and bolts, and cylinders or pipes, as well as square.
2nd. It is made entirely of steel or wrought iron case hardened, having no part of cast or malleable iron, and is vastly more durable.
3rd. The workmanship is better as will be seen by comparing it with any other.
4th. These wrenches are made interchangeable.

Index Milling Machine.

The jaws and dial spindle, besides the graduated rotary movement, have a vertical movement of 5 inches. The tool spindle has a lever traverse movement, and a lateral feed. The machine, with the index centres and index for mills, is adapted to sinking dies, cutting gears, mills, taps, and general milling and tool work of all kinds. Weight, 1500.

Common Milling Machine.

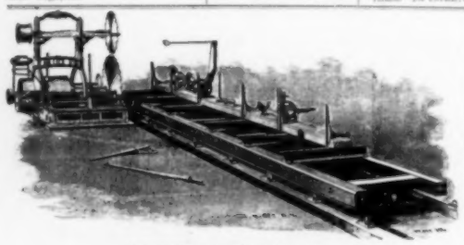
With rack and pinion feed, tail block and jaws. This machine is used more extensively than any other, for manufacturing sewing and knitting machines, Guns, Pistols, and similar work. Weight, 1200 pounds. An Automatic Stop-Motion when ordered.

Hot Trimming Press.
For Trimming Hot Forgings.

Height, ... 7 feet.
Length of Stroke, ... 9 inches.
Weight, ... 2200 lbs.

Three Spindle Press Drill.

Height, ... 5 feet, 6 inches.
Weight, ... 600 lbs.
Length of Spindle, ... 12 inches.
Diameter, ... ¾ inch.
With overhead works complete.



LANE'S PATENT IMPROVED LEVER SET
Double Circular Saw Mill,
With Patent Friction Feed.

Engine Lathes.
ANY SIZE MADE TO ORDER.

Swing.	Length of Bed.	Distance bet. Centres.	Weight.	REMARKS.
13 in.	4½ feet.	2 feet.	1100 lbs.	Back Gear Screw Cutting Bench Lathe
13 "	5½ "	3 "	1150 "	Back Gear
13 "	6½ "	4 "	1200 "	Back Gear and Screw Cutting
15 "	5½ "	3 "	1300 "	" " "
15 "	6½ "	4 "	1350 "	" " "
15 "	7½ "	5 "	1400 "	" " "
18 "	6½ "	4 "	2000 "	" " "
18 "	7½ "	5 "	2100 "	" " "
18 "	8½ "	6 "	2200 "	" " "

Block to swing 20 inches.

HAND LATHE.

Swing, 16 in. Length of Bed, 5 ft. Distance bet. Centres, 3 ft. Weight, 750 lbs. 12 in.

Each Lathe furnished Complete with Counter Shaft, Cluster Steps and Wrenches, Spindles of Steel, and Brass of Best gun metal. Lathes with Johnson's Patent Improvement for turning arcs and spheres of required diameter, such as ball handles, &c., &c., are manufactured to order by the Windsor Manufacturing Company.

LANE'S PATENT IMPROVED LEVER SET
Single Circular Saw Mill,
With Patent Friction Feed.

No. 2
SCREW MILLING MACHINE.

DIMENSIONS OF SCREW MILLING MACHINES.

No.	Length of Bed.	Width.	Size of Spindle Bore.	Weight.	
1	3 feet 6 in.	8 inch.	¾ in.	600 lbs.	Back Gear
2	4 " 6 "	9 "	¾ "	800 "	Set on Bench
3	7 " 6 "	12 "	1 "	1200 "	

Complete with Counter Shafts and Wrenches.

We are getting out new Patterns of Improved Screw Machines with self-receiving heads, and improved cut of end and head stocks, and are prepared to furnish the different sizes. Heads made and fitted if ordered.

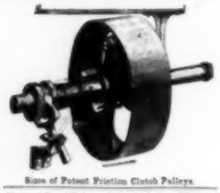
Ball's Patent Repeating and Single-Loading Carbine.

Sectional View of Magazine.

Punching Press.

With double gear and balance wheel
Weight, 5 feet, 9 inches.
Length of stroke, 3½ inches
Weight, 3200 pounds

BISHOP'S PATENT FRICTION CLUTCH PULLEY.



Sizes of Patent Friction Clutch Pulleys.

Diameter.	Face.	Thickness.	Diameter.	Face.	Thickness.
6 inches.	7 inches.	2 inch.	24 inches.	8 inches.	1 inch.
8 "	7 "	2 "	24 "	9 "	1 "
10 "	7 "	2 "	30 "	8 "	1 "
12 "	7 "	2 "	30 "	9 "	1 "
14 "	7 "	2 "	36 "	8 "	1 "
16 "	7 "	2 "	36 "	9 "	1 "
18 "	7 "	2 "	42 "	8 "	1 "
20 "	7 "	2 "	42 "	9 "	1 "
22 "	7 "	2 "	48 "	8 "	1 "
24 "	7 "	2 "	48 "	9 "	1 "

In addition to the above regular sizes, we have a variety of patterns designed for particular places, and all sizes and kinds made to order, will be made to order. Counter Shafting, Hangers and Pulleys furnished complete when desired.

Descriptions, prices, lists and full information furnished on application. All kinds of Machinery made to Order.

Arrangements made for Manufacturing any New or Patented Machines.

Please Post this in a Conspicuous Place.

FIG. 1—BROADSIDE PUBLISHED BY THE WINDSOR MFG. CO. IN 1865. THIS COMPANY WAS THE FORERUNNER OF THE JONES & LAMSON MACHINE CO., NOW OF SPRINGFIELD, VT.

New England Wins Tool Mastery

Romantic Story of the Flowering of a Great Industry Founded in the Independent Spirit and Mechanical Genius of Colonists Sketched Historically From Primitive Beginning to Present Pre-eminence

BY PROF. JOSEPH W. ROE

NEARLY all of the well-known machine tools originated in England or New England. Other countries and districts have contributed to their development, but these contributions have been either crude beginnings, which others have developed into useful devices, or refinements and modifications of standard tools already existing. Of the standard tools the boring machine, engine lathe, planer, shaper and steam hammer were developed in England, in that order, between 1800 and 1850. The interchangeable system of manufacture based on the use of fixtures and limit gages, the milling machine, turret lathe, drop hammer, vertical boring mill, automatic lathe and precision grinders and gear cutters were developed in New England in the period extending from 1800 to about 1880. During the first 40 or 50 years of this development England led; then the leadership shifted to New England and since 1850 most of the improvements in both designs and standards of workmanship have come from America, principally from New England.

Machine Tool Historian

HOW New England rose to a position unsurpassed in mechanical science throughout the world, is a subject of genuine historical significance. Joseph W. Roe, assistant professor of machine design of Sheffield Scientific School, Yale University, the author of the article, is a foremost authority in tracing machine tool origin and development in this country. His book on "English and American Tool Builders" is regarded as a standard in its line.

The New England mechanics came chiefly from the stock which made the Midland and northern counties of England leaders in industrial life. The farm life of early New England developed ingenuity and resourcefulness, and every barn had its work bench where the farm tools were made and repaired. Nearly all the early generation of mechanics come from these hill farms. Even in colonial times small attempts at manufacturing were continually springing up which were stifled by parliamentary legislation or died from the want of raw material and the poor transportation facilities which sharply limited their markets. Joseph Jenks started an iron foundry at Lynn in 1642 where he also made "Sithes and other edged tools". To this day his family are successfully engaged in manufacturing. The Leonards at Raynham, Orr at Bridgewater and Joseph Holmes were other colonial families.

These early attempts at manufacture, however, did not involve machine tool building as we understand it now. Machine tools are a specialized product, used by manufacturers and not by the general public. They were called into existence when other industries passed the handicapped stage, and yet this very expansion of these industries is so bound up with the development of the machine tools as to raise the old boyhood question: "whether the hen is the mother of the egg, or the egg the mother of the hen." No large modern industry exists independently of machine tools; either they are used to produce goods directly as guns, typewriters and sewing machines, or to make the special machines, such as looms and shoe machinery, which do turn out the product. There is no product more than twice removed from a machine tool.

In New England this double expansion, of manufacturing and tool building, which go hand in hand, began shortly after the Revolution. The restrictions of English legislation had been removed. The invention of Whitney's cotton-gin in 1792 made possible the southern crop. Part of this was shipped to New England as raw material for the growing textile industry and the rest, an enormous total, was exported to Europe. The profits from the export trade made the south wealthy and as the latter did practically no manufacturing, this opened up a rich market for New England's finished products. The rapid development of coastwise trade, of steam navigation and later of railways, steadily widened this market until in a single generation, from being purely local, it had become nation-wide. This growth began in Rhode Island when Samuel Slater built the first American cotton spinning machinery for Moses Brown at Pawtucket in 1789. He had worked for Arkwright & Strutt in England, and had brought the knowledge of their machinery to this country. He was barely 20 years old at the time and soon married the daughter of

FIG. 2—OLD SCREW-CUTTING LATHE WITH WOODEN WAY, BUILT BETWEEN 1830 AND 1840 BY HUMPHREY WINSLOW, PROVINCETOWN, MASS.

Oziel Wilkinson, in whose family he lived. This family was a remarkable one. Oziel Wilkinson was himself a good mechanic and a successful manufacturer. His five sons all became successful manufacturers, and his four daughters all married manufacturers. Of these Slater and David Wilkinson were the most successful. The latter built a steamboat in 1794—13 years before Fulton's CLERMONT, and invented and patented a slide lathe in 1797. Another Pawtucket mechanic, Sylvanus Brown, is also said to have invented the screw-cutting slide lathe as early as 1791 and to have used it to cut screws for sperm-oil presses.

In 1796 there were in Pawtucket "three anchor forges, one tanning mill, one flouring mill, one slitting mill, three snuff mills, one oil mill, three fulling mills, a clothier's mill, *one cotton factory*, two machines for cutting nails, one furnace casting hollow ware, moved by water, one machine for cutting screws, moved by a horse, and several forges for smith's work." By 1815 there were 140 cotton mills within 30 miles of Providence, employing 26,000 hands. The industry spread from the head of Narragansett bay throughout all eastern Massachusetts, and up the Merrimac valley as far as Manchester, N. H. Naturally shops sprang up to build textile machinery. As no machine tools were available, these shops built their own and then began to sell tools. As there was no large demand for any one kind of tool, and the day of specialization had not set in, they were ready to build almost anything. We can trace this development briefly, by instances here and there.

Early New England Shops

Slater and Ira Pitcher helped to found the Amoskeag Mills at Manchester N. H., in 1825, and by 1840 this company had a three-story shop 400 feet long with foundries and forge shop where they manufactured machine tools, boilers, engines and locomotives as well as textile machinery. Wm. A. Burke, its superintendent, left there to start the Lowell Machine Shop, another early New England shop of great influence.

About 1830, Ira Gay, another Pawtucket mechanic, founded the Gay & Silver Co., at North Chelmsford, where many of the old machine tools were built. F. W. Howe, who contributed most to the development of the turret, lathe and milling, learned his trade here. Other mechanics went from here to Washington, Fitchburg and elsewhere carrying the designs of these tools. James S. Brown, son of Sylvanus Brown, by 1840 had a large shop in Pawtucket where he built not only textile machinery but a tool, including a bevel gear, cutter, boring machine, grinder and lathes.

The Providence Tool Co., and many other plants about Providence, sprang from these old shops, which were started for building textile machinery. But the cotton industry while probably the most important is by no means the only one which has influenced tool building. Providence early became a center for the jewelry trade and this had its effect on high grade tool building. The foremost tool building firm springing from this source is the Brown & Sharpe Mfg. Co., which was started in 1833 by David Brown and his son, Joseph R. Brown, to make clocks, watches and mathematical instruments.

The machine tools which sprang from the cotton trade were of the standard types, lathes, planers, drills, etc., and in a general way they paralleled the development of these machines going on at the same period in England. Another industry, however, was developing more original methods and machines at the same time. Eli Whitney in New Haven, and Simeon North in Middleton, began making guns and pistols by machinery about 1800 and developed the interchangeable system of manufacture by the use of fixtures and gages. Fol-

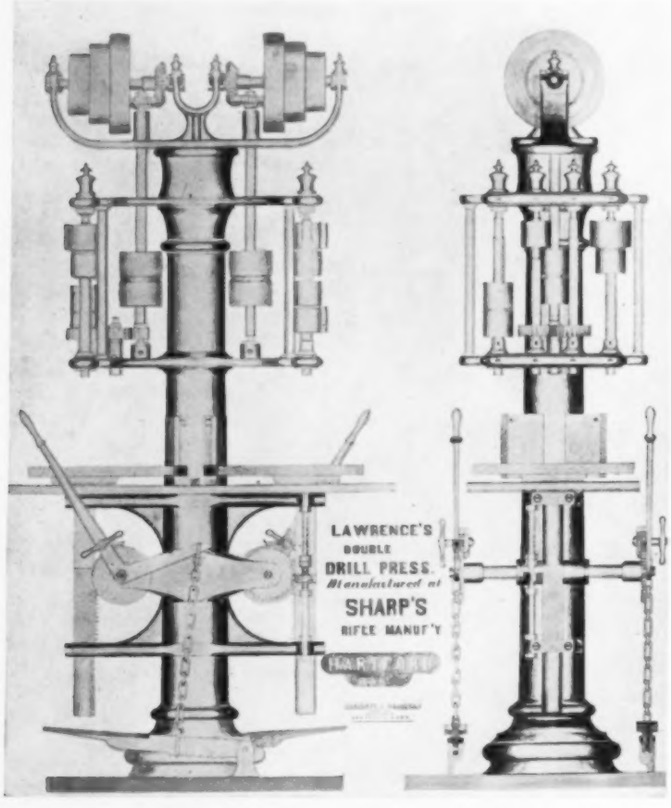


FIG. 3—DOUBLE DRILL PRESS DESIGNED BY R. S. LAWRENCE, HARTFORD, CONN., ABOUT 1853

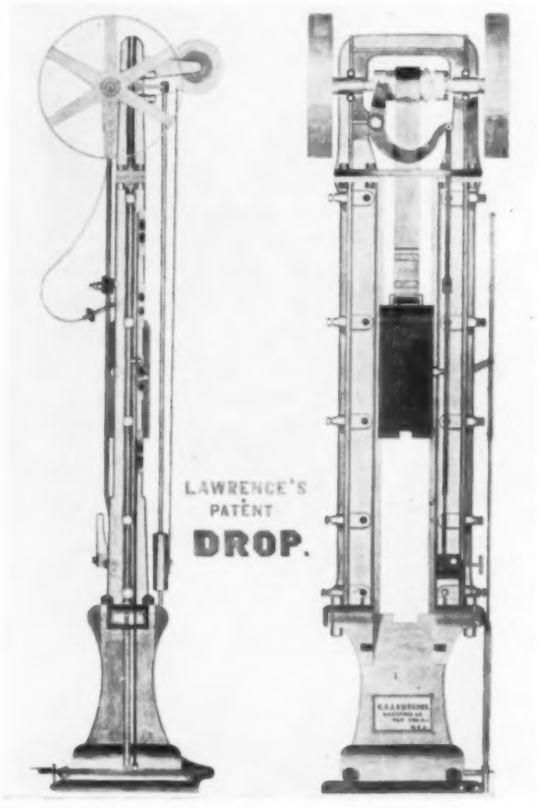


FIG. 4—STRAP DROP-HAMMER DESIGNED BY R. S. LAWRENCE ABOUT 1853

lowing them came a second generation of gun makers about 1850. The Colt Armory at Hartford, Robbins & Lawrence at Windsor, Vt., and the Ames Mfg. Co. at Chicopee, Mass. The methods developed and the mechanics trained in these gun shops have profoundly influenced tool building, not only in New England but throughout the world. A large number of the tool building firms throughout the country sprang from them and in them the turret lathe, drop hammer, plain milling machine and automatic screw machine had their beginning.

The region centering in southern Vermont and New Hampshire and central Massachusetts developed most of the standard wood working machines. This district is heavily timbered and poor farming land. The ingenuity of its inhabitants therefore turned toward making all sorts of wooden products, varying from shoe pegs to house framings. Baxter D. Whiting of Winchenden, who died in 1915 at the age of 98, saw the growth of the machinery for doing this and contributed much of it. The Fay & Eagan Co., H. B. Smith Co., and many other companies south and west, trace back to this region.

The First Specialty Shop

It is said that Gage, Warner & Whitney of Nashua, N. H., established in 1837, was the first shop to specialize on building machine tools. There seems to have been no limitation other than this for although the shop was a small one they were prepared to build planers of all sizes; lathes of all kind and sizes from the smallest watchmakers' up to a size suitable for turning locomotive driving wheels 6 or 8 feet in diameter, bolt-cutting machines, "upright and sewing drills," boring machines, slabbers of all kinds, gear-cutting engines of all sizes "for shaping and smoothing the teeth of gear wheels with perfect accuracy", and power punching machines of various sizes. Such a list, however, was characteristic of those days.

The catalogs of that time were large broadsides or posters, about 3 feet by 4 feet which were posted up on the wall. The writer has one of these which advertises that Lucius W. Pond, of Worcester, is prepared to furnish iron planes, 3 to 36 feet long, and lathes from 14-inch swing by 5 feet bed to 8 feet swing to 36 feet bed. It gives wood cuts of various kinds and signs of tools, including vertical and horizontal boring mills, gear cutting machines and drill presses. Another one, shown in Fig. 1, by the Windsor Mfg. Co., a successor of Robbins & Lawrence and a forerunner of the present Jones & Lamson Machine Co., illustrates turret and engine lathes, monkey wrench,

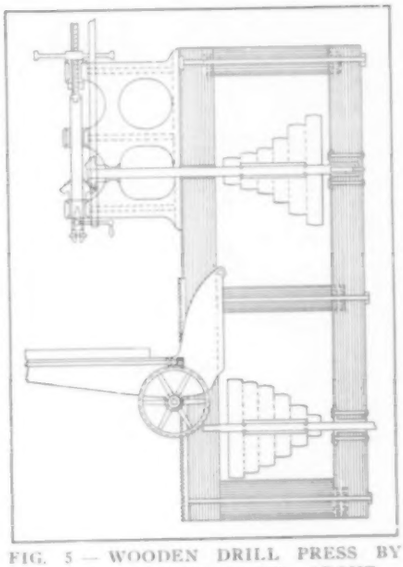


FIG. 5 — WOODEN DRILL PRESS BY HOWE AT WINDSOR, VT., ABOUT 1846-47

plain and index milling machines, presses, upright drills, a trip hammer, planers, repeating rifles, saw-mills, rock channeling machine with boiler and engines, diamond rock drill. It also advertises to build special machinery for making guns, pistols, sewing machines and sewing machine needles; and in addition offers a large variety of good second hand machinery. This was printed about 1865. Wood, Light & Co., one of the best known of the old Worcester firms, was among the first to develop and manufacture an index milling machine.

Has First Milling Machine

Practically all of the very early tools have long since disappeared. Here and there a quaint machine comes to light

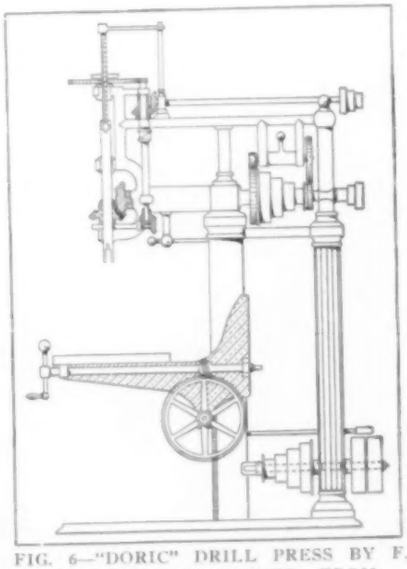


FIG. 6—"DORIC" DRILL PRESS BY F. W. HOWE, DEVELOPED FROM DESIGN SHOWN IN FIG. 5

but its maker and history are seldom known and it usually goes into the cupola. The writer has Eli Whitney's first milling machine, built before 1818. It ran its long and useful career, was rescued from going into the junk pile and spent 25 years under a hay-mow, but is now properly cared for in the museum of the Sheffield Scientific School. Fig. 2 shows a wooden screw-cutting lathe built in the 1830's by an eccentric but clever old mechanic named Humphrey Winslow for his own use in Providence, R. I., while he was employed there at his trade. He moved to Provincetown on Cape Cod and ran a small brass foundry for boat fittings and made brass musical instruments "as a side line". He used this lathe to cut threads and to make the forms for shaping his cornets and trombones. The town laid out a new street in 1868 and moved his buildings a few feet. This peeved the old man so that he never did a stroke after that. The machine is now in possession of the University of Illinois.

Figs. 5 and 6 were taken from two old drawings in the files of the Jones & Lamson Machine Co. They were made by F. W. Howe, probably in the late 40's. They show the pioneer timber and the Greek doric stages in the development of drill press design. Howe, unlike Winslow, left his mark on New England tool building. Some of the old machines at North Chelmsford would indicate that he took the rudiments of the turret lathe with him when he went from there to Robbins & Lawrence, at Windsor. Howe and R. S. Lawrence were working there together when that company was doing its most brilliant work. Howe went from Windsor to Providence where he was superintendent of the Providence Tool Co., and was later with the Brown & Sharpe Co. He built their first building on their present site and several of their standard tools are developments of his designs. In fact, the castings for their first screw machine were made from his patterns at Windsor.

Early Failures and Successes

R. S. Lawrence was another splendid mechanic. The Robbins & Lawrence firm was very successful from 1842 to 1853, but was ruined by the operations of its senior partner. Lawrence came to Hartford in 1853 and built a branch shop, which was sold to the Sharps' Rifle Mfg. Co. after the failure. He continued as superintendent of this plant and as long as he was in charge it prospered. After he left, it passed through the hands of the Weed Sewing Machine Co., was enormously expanded for the manufacture of Columbia bicycles, and is now part of the Pratt

& Whitney works. Lawrence brought with him to Hartford a design of plain milling machine which was modified slightly by F. A. Pratt and is known today as the Lincoln miller. Two of his tools, a strap drop hammer and a double drill press, are shown in Figs. 3 and 4. These show that, like most of the others of that day, he was ready to build and sell any tool which he had designed for his own use.

Hartford in 1855 probably had the most advanced manufacturing practice in the world. The Colt Armory had just been built and E. K. Root, one of the greatest of the New England mechanics, had equipped it with over 1400 machines, most of them special and some of them so well designed that they are doing useful work today.

William Bement, who founded the Bement works in Philadelphia, was the son of a New Hampshire farmer and blacksmith. He learned the machinist trade in a shop manufacturing woolen and cotton machinery and worked for the Amoskeag and Lowell machine shops under Burke, and went from the latter to Philadelphia where he did his life work. John and Salmon W. Putnam, who founded the Putnam Machine Co., at Fitchburg, also began in manufacturing parts required for cotton machinery.

Flagg, the Worcester Pioneer

Uncle Sammy Flagg was the father of tool building in Worcester and most of the early mechanics there were trained in his shop. He made hand and engine lathes in rented quarters in the old Court Mills. They were light affairs with wooden beds, wrought iron strips for ways, chain operated carriage and cast gears. Worcester was for many years the tool-building center for the United States. One of the reasons for this was the facilities it offered for mechanics to begin business for themselves. There were a number of large buildings like Merifield's which rented space with power to small enterprises. Not only Flagg, but Coe's, Daniels, Wood, Light & Co., Coombs, Lathe & Morse, Whitcomb, Pond and J. A. Fay all began, or at some time operated in this way. Some, like Coe's, have continued in Worcester to this day; others, like Whitcomb, are still running there after various changes and consolidations, and others, like Pond, have moved elsewhere. Pond bought out Flagg and organized the Pond Machine Tool Co., which later moved to Plainfield, N. J., and is now part of the Niles-Bement-Pond Co.

The Ames Mfg. Co., of Chicopee, Mass., which went out of existence about 20 years ago, had at one time one of the largest and most influential shops in New England, employing more than 1000 men. It was an off-shoot of the old Ames & Fisher shop in North Chelmsford, started by Nathan P. Ames in 1791. His two sons learned their trade there and moved to Chicopee about 1830. The Ames Mfg. Co., which they established, continued for about 60 years.

Reference already has been made to Robbins & Lawrence, the other shop which shared with the Ames company in introducing the American interchangeable system in England. This shop and its various successors at Windsor and Springfield, Vt., seem to defy economic laws. They are in a farming section far from raw material and a market and yet the two towns shelter a whole group of prosperous tool-building firms such as the Jones & Lamson and Fellows companies. This has been attributed to peculiarly favorable labor conditions, but no doubt much of it has been due to the leadership of a remarkable succession of able mechanics.

After the failure of the original Robbins & Lawrence firm the Windsor plant was purchased by Lamson, Goodnow & Yale, in 1859, and has continued in operation through a succession of changes to this day. The firm became the Jones & Lamson Machine Co. in 1879, and 10 years later moved to Springfield, Vt., 6 miles off the railroad. The early scattering of energy on a diversity of products ceased and the firm is now a conspicuous example of concentrated specialization. The Windsor plant was taken over by some of the mechanics who preferred not to move with the business and recently it has been purchased by the National Acme Mfg. Co., of Cleveland.

Like the Windsor shop, the Pratt & Whitney Co. have not only been leaders themselves in tool building but they have trained men who have led in the art all over the country. F. A. Pratt and Amos Whitney both learned their trade in shops building textile machinery, one at Lowell and the other at Lawrence. Both came to Hartford about 1850 and were workmen at the Colt Armory and as foreman and contractor later at the Phoenix Iron Works, run by Levi Lincoln. In 1860 they rented small quarters and began manufacturing a linen winder for the Willimantic Linen Co. The firm succeeded from the start and soon became leaders in the building of machine tools and particularly special tools for building guns and sewing machines. They have probably built more gun machinery than any other firm in the world and there is hardly a government which they have not supplied. The influence of this shop may be gathered from the list of those who have worked there, among whom are Parkhurst, Hansen, Warner, Swasey, Henn and Heckwessel of the National Acme Co., Bardens, Johnston of Potter & Johnston, Eleason, Bullard and Gardner.

Influence of Brown & Sharpe

The largest of the New England tool building firms, Brown & Sharpe, have not sent so many workmen out to establish other plants, but probably no firm in the world has had a deeper influence on the standards of workmansip in modern machine shops. Their introduction of the venier and micrometer calipers in 1851 and 1867 has improved accuracy of machine work everywhere. Neither of these originated with them but they were the first to put them on the market in a practical form as an everyday tool for the machinist. For many years they have been the foremost builders of all forms of standard gages. The first machine they built was for their own use in the manufacture of these gages and sewing machines. They began making turret lathes about 1860, modifying and improving the design of F. W. Howe who had come from Windsor to Providence. The universal milling machine was invented in 1860 by J. R. Brown at Howe's suggestion to mill the flutes in twist drills. The cylindrical grinder, another of Mr. Brown's inventions, was first used for grinding need bars on the Wilcox & Gibbs sewing machines not long after. The first universal grinder was exhibited by him at Philadelphia in 1876 just before his death. While many have contributed to the great work of this firm the ruling mind was that of Joseph R. Brown. H. M. Leland, who worked under him, has said that no one has done more to raise the standards of American manufacture; and such men as Slocumb, Beaman and Smith; C. H. Norton, Grant, Shaw and Le Blond, have spread his standards elsewhere.

New England no longer monopolizes the machine tool industry. Philadelphia has become a great center for it, but Bement came from New England, and Sellers worked there, and Bancroft, his first partner, came from Providence. Cleveland is another great center, but nearly all the mechanics who made it so came from New England, most of them from Hartford. Cincinnati is another, and the New England influence is here evident but to a much less degree. In the newer centers now springing up in the middle west we also can see the influence of the old New England mechanics who developed a large share of the modern machine tools and did so much to make this country the leader in their manufacture.

Great Consumer of Iron and Steel

Hundreds of Foundries and Manufacturing Plants Yielding a Wide Range of Machine Products Make New England a Great Distributing Center—Jobbers Play a Large Part—Early History of Ironmaking

BY E. C. KREUTZBERG

NEW ENGLAND enjoys the distinction of being the cradle of the country's most important and extensive industry, the manufacture of iron and steel. No sooner had the Pilgrim fathers landed safely on Plymouth rock than they began to investigate the country, and one of the results was the discovery, in 1629, of iron ore on the Saugus river near Lynn, Mass. It was not until 1642, however, that anything was undertaken toward the development of this deposit. Historians tell us that in that year, Robert Bridges and John Winthrop Jr., son of Governor Winthrop, went to England with some specimens of the ore, formed "The Company of Undertakers for the Iron Works", consisting of 11 English gentlemen, and returned with £1000 sterling to be expended for the establishment of a plant. In the next year was commenced the erection of a blast furnace on the west bank of the Saugus river at Lynn. This was the first plant of the kind to be established in America. On the completion of the furnace in May, 1645, several tons of "sowe" iron were made and the first article cast was an ordinary iron pot, weighing nearly three pounds and holding about one quart of water. This pot still is preserved at Lynn as the first casting made in this country from native ore.

Produces Eight Tons Per Week

It took some time to get the furnace operating properly but by August, 1648, Governor Winthrop was able to write to his son at Pequod, Conn., that "the iron work goeth on with more hope. It yields about 7 tons per week". A month later he again wrote that "the furnace runs 8 tons per week, and their bar iron is as good as Spanish". By that time the works consisted of a combined furnace and foundry, and a refinery forge, and for some years it furnished most of the iron used in the colony. Later its owners became involved in frequent lawsuits arising from the overflow of water in the river dam, and the plant became unpopular because of the fear that its constant requirements would lead to a scarcity of timber. About 1688 it was abandoned. Its surviving vestige today is a pile of slag which is covered by vegetation.

In the meantime the iron industry continued to develop. Most of the plants established were ore bloomaries but some were blast furnaces.

Transforms Industry

HOW New England after building up a leadership in the making of iron in colonial days which continued for some years thereafter, turned its mechanical talents to the production of manufactures of iron and steel instead is an interesting story of industrial transformation. Mr. Kreutzberg, New York associate editor of THE IRON TRADE REVIEW, *connects the present with the past in his article. Considerable of the data came from the author's personal study of conditions on the ground. The historical facts presented are from Swank's "History of Iron in All Ages".*

The product of the latter in some cases was "sowe" iron, although at most furnaces the output was converted directly into castings. Until the early part of the nineteenth century, the only ore employed was bog and pond ore, the only fuel was charcoal, and water furnished the only power. The second blast furnace, to which a forge immediately was added, was built at Braintree in 1646. In 1656 was established at Raynham the so-called Taunton forge and this proved the foremost industry of its kind in New England, continuing in successful operation until 1865. Numerous blast furnaces, forges and bloomaries were established in 1660 and later at Concord, Rowley, Canton, Topsfield, Pembroke, Boxford, Hingham, Bridgewater, Carver and other points. In 1725, King's furnace was established at Taunton, its output being devoted to the manufacture of hollow ware; this furnace continued in operation until after 1840. Among the founders of these early iron works were Richard Leader, Joseph Jenks, Henry and James Leonard, Ralph Russell, George Hall and John King, most of whom were the forebears of distinguished New England families. The Leonards were by far the most active in extending the industry in the early days.

In 1731 there were in the whole of New England six blast furnaces, which converted their output directly into hollow ware and other castings, and 19 ore bloomaries. A bloomary established at Bridgewater in 1722 remained active as late as 1850. Toward the end of the eighteenth century, Bristol and Plymouth counties alone had 14 blast furnaces and numerous other stacks were scattered elsewhere in the state; Connecticut had three or four furnaces in its eastern section and a number in the west; and Rhode Island had a few furnaces, notably the Hope furnace, which was established on the Pawtucket river in 1735. In 1800 the Hope furnace produced the first hollow cast cannon. Vermont had a considerable number of blast furnaces. One of the iron enterprises in this state, the East Middlebury forge, was not abandoned until 1890. Maine and New Hampshire never had more than a few scattered bloomaries and blast furnaces. Bog and pond ore was used quite extensively, particularly in eastern Massachusetts, until 1825 to 1830. It was not until around the end of the first quarter of the nineteenth century that the iron producing industry of New England ceased to flourish as it had in the past. The exhaustion of the bog and pond ores, of timber for charcoal and the drying up of many streams which furnished water power, as well as the growing use in this country of pig iron imported from Scotland, all contributed toward closing down the various plants one after another.

Charcoal Furnaces Still Active

Only two of these old stacks still are operating. These produce from the valuable deposits of hematite ore in western Connecticut and Massachusetts, charcoal iron which finds a wide and ready market by reason of its unusual qualities. The oldest of these stacks is that of the Barnum-Richardson Co., Lime Rock, Conn. This furnace originated in a bloomary forge built by Thomas Lamb in 1734, who produced some 500 to 700 pounds per day of the celebrated

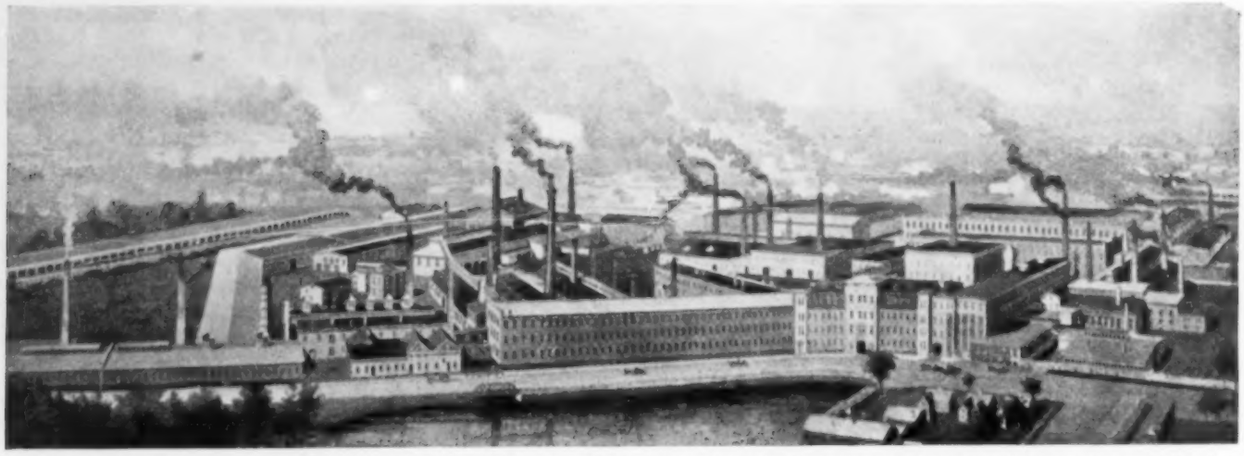


FIG. 1—MANUFACTURING WIRE GOODS IS ONE OF THE PRINCIPAL INDUSTRIES OF NEW ENGLAND—THE NORTH WORKS OF THE AMERICAN STEEL & WIRE CO., WORCESTER, MASS., HAS AN ANNUAL CAPACITY OF APPROXIMATELY 100,000 TONS OF WIRE, COLD DRAWN SHAFTING AND NAILS

Salisbury iron. Shortly later the present blast furnace was erected. The other furnace still in operation is that of the Richmond Iron Works, Richmond Furnace, Mass., which was built in 1829. From the tonnage standpoint these furnaces contribute a very unimportant portion of the production of the country. New England's pig iron output of late years has been as follows: 1912, 17,000; 1913, 12,800; 1914, 6500; 1915, 7800; 1916 5719 tons.

The first steel produced in New England appears to have been made in Connecticut by Samuel Higley, of Simsbury, Conn., who in 1728, on filing the details of his process before the legislature, was given the exclusive right of steelmaking for a period of 10 years. The Rev. Jared Elliott, grandson of John Elliott, in 1762, was awarded a gold medal by the London Society of Arts, "for producing malleable iron from the American black sand." In 1775 or 1776, Eliphalet Leonard, of Easton, Mass., due to the extreme scarcity of steel in the colonies for war purposes, attempted to make steel by the cementation process and succeeded. His son in 1787 erected a 3-ton furnace and followed this up with other furnaces, obtaining from his most improved furnace a production of about 100 tons of steel a year. During the progress of the Revolution, a German at Cumberland, R. I., made steel from pig iron by the German method and later several other plants were established in New England, some making steel by the blister method and others by the German method.

Manufacturing is Begun Early

General manufacturing of iron products developed on an extensive scale at an early date. One of the first plants established was a forge, built at Lynn in 1647, for the manufacture of scythes and other edged tools; here were made the dies for the first silver coins minted in New England. Hugh Orr, a Scotchman, in 1738 established a gun factory at Bridgewater and about 1748 made 500 muskets for the province of Massachusetts. The needs of the colonies during the Revolution furnished great impetus to the iron industry and in 1784 there were in Massachusetts alone 76 iron works, including blast furnaces, manufacturers of tools, fire arms, etc. By 1793 there were a great many manufacturers of machinery, edged tools, firearms and hardware. In 1794 the government arsenal at Springfield was established. A list of products for 1798 includes bar iron, cut and hammered nails, spades and shovels, card teeth, saws, scythes, metal buttons, cannon balls, bells, fire arms, sheet iron, wire, etc., all of which were made in quantities which were large for those times. In 1804 there were in Plymouth county alone 10 forges making 200 tons of bar iron annually from scrap. The products of the Federal blast furnace in Massachusetts in 1804 included rolls for slitting mills, potash kettles, stoves, plates, anvils, large hammers, cannon shot and all kinds of machinery castings. By 1800 the manufacture of bar iron, sheets, nails and nail rods, farming implements, stoves, pots and household utensils, castings for ships and machinery and other purposes constituted the most important branches of productive industry in Rhode Island. Incidentally, the first foundry in New England for melting pig iron was built at Lime Rock, Conn., about 1830, and still forms a portion of the Barnum-Richardson Co.'s plant.

Nailmaking always has been one of New England's leading industries and it therefore is interesting to note that the first mill for slitting nail rods, according to tradition, was erected at Milton, Mass., in 1710. By 1750 the number of slitting mills had increased to four. In 1795 there were in Bristol, Plymouth and Norfolk counties alone, 11 slitting mills which rolled and cut 1732 tons of iron into hoops and nail rods, and these counties also had a great number of nail and smith shops.

Nailmaking a Household Industry

The first cut nail in the world is said to have been made by Jeremiah Wilkinson at Cumberland, R. I., in 1777. During the Revolution he also made pins and needles from wire which he drew himself. The manufacture of nails was one of the household industries of New England during the eighteenth century. The chimney corners of countless families were equipped with small forges by which great quantities of nails were produced; they were made from nail rods obtained from merchants who bought back the nails. In 1795, Jacob Perkins, of Newburyport, Mass., invented a nail-cutting machine which eliminated nailmaking by the old methods, with the result that the business of the slitting mills practically disappeared. Making tacks by hand also was a household industry in New England during the eighteenth century and until around 1840. In those days a man could make about 2000 tacks a day. The larger percentage of the country's tacks now are made in New England by mechanical methods.

The experience of nations shows that where civilization has dwelled long in a land, the inhabitants thereof are forced to depend to a growing extent on raw materials obtained elsewhere. This is particularly true with

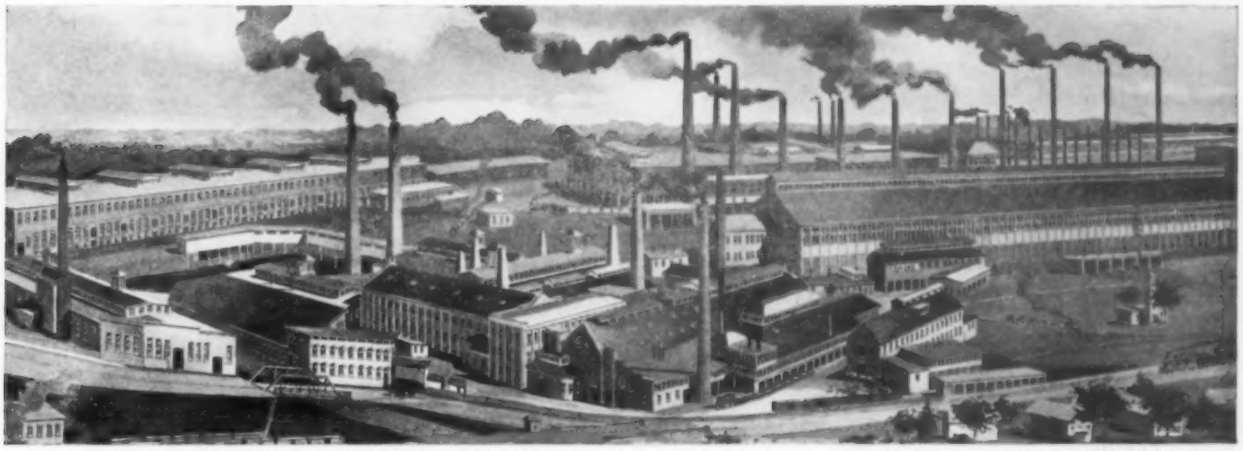


FIG. 2—THE SOUTH WORKS OF THE AMERICAN STEEL & WIRE CO., WORCESTER, MASS., BUILT IN 1846. EQUIPPED WITH ACID AND BASIC OPEN HEARTH FURNACES AND HEROULT ELECTRIC FURNACE. THE PLANT INCLUDES WIRE ROPE AND SPRING DEPARTMENTS

reference to New England. Her iron ores and other raw materials were meager, inferior in quality and poorly distributed as compared to the Lake Superior and Connellsville districts. Nevertheless her people, by exercising that ingenuity and inventive genius which has characterized them from the earliest colonial days, continue to enjoy their full share of prosperity by receiving the raw materials of the country and converting them into finished products for distribution to all parts of the inhabited globe. The south furnishes cotton and New England sells it as cloth; New York and Virginia furnish pig iron and New England sells it as machinery and castings for diversified purposes; Pittsburgh furnishes steel and New England converts it into tools, ships, wire, machinery parts and a thousand other different forms.

Jobbers Large Factor in Distribution

Going to town in New England means going to Boston. Boston is the ocean and railroad transportation center of New England and fully 75 per cent of the manufacturing capacity of that section of the country is located at points less than 100 miles distant. Therefore, while Boston itself is not among the really important consuming cities, it is the logical headquarters for the New England branch offices of the various iron and steel companies, as well as for many of the jobbers who maintain important stocks. The New England jobbers distribute a much larger percentage of the iron and steel requirements than is usual in some other sections of the country. This is due, not only to the comparatively long distances from the mills, but also to the countless number of small consumers in New England, and their multiplicity of diversified requirements. While iron and steel are used for manufacturing purposes in practically every town and hamlet in New England, the most important centers of consumption are the large cities, such as Worcester, Providence, Springfield, Taunton, Hartford, Bridgeport, New Britain, Waterbury, New Haven, Pawtucket and Fitchburg. The city of Worcester alone has some 700 plants and manufactures in excess of 300,000 different articles, in most of which iron or steel in some form is required as a raw material. The diversity of the iron and steel products of New England is illustrated by the following list of some of the important articles which are manufactured within 50 miles of Boston: Textile machinery, labeling machines, grinding machines, vacuum cleaners, clutches, all kinds of pressed steel products, steam engines, turbines, pumps, motors and electrical equipment, all kinds of structural steel, steel ships, slot machines, rolling mills, boilers, iron and steel ornamental work, wire and all kinds of wire products, gas producers, skates, fire arms and ammunition, all kinds of musical instruments, automobile crank shafts and other parts, lathes, shapers and practically all other machine tools, wrenches, twist drills, clippers, taps and dies, micrometers and practically all other small tools, paper box machinery, bicycles, steel railroad and street railway cars, baby carriages, tacks, iron beds, valves and fittings, radiators and countless other products. The manufacture of all kinds of supplies, such as grinding wheels and abrasives, leather and rubber belting, lubricants, also constitutes a huge industry.

Although accurate estimates of consumption are extremely difficult to make, it is calculated by competent authorities that the following is a fairly approximate representation of pig iron consumption in New England: 1910, 371,000 tons; 1911, 392,000 tons; 1912, 445,000 tons; 1913, 345,000 tons; 1914, 330,000 tons; 1915, 430,000 tons; 1916, 575,000 tons. Present consumption is at a still higher rate and it is believed that 315,000 tons is a conservative estimate of the iron melted in New England during the first half of 1917. Of approximately 400 foundries which comprise the melting capacity of New England, only a few have annual requirements in the neighborhood of 25,000 tons or more. Not more than 12 per cent of the total number of foundries melt more than 2500 tons a year. The majority melt less than 1500 tons each and many have annual requirements of less than 100 tons. These figures, while approximating the pig iron consumption, are by no means an indication of the output of gray iron, malleable and steel castings, since they make no allowance for the scrap consumed.

Obtaining Pig Iron

The chief source of supply for pig iron in normal times is the Buffalo district, which frequently ships 50 per cent of the iron consumed in New England. At present, some 35 per cent comes from New York state, while Virginia supplies about 25 per cent, eastern Pennsylvania about 15 per cent, the south 10 per cent and other sources 15 per cent. Virginia furnaces now are supplying more iron proportionately than ever before, due to the advantage which they at present enjoy by reason of the present market prices. In times past there has been considerable importation of pig iron from Scotland, England and Germany. Since the outbreak of the war, however, these sources have not figured. Most of the foundry iron consumed in New England is taken

by manufacturers of textile machinery. Makers of stoves, radiators, heaters and machine tools and other kinds of machinery also are heavy consumers.

By-product Coke Used Largely

The total consumption of foundry coke throughout New England is estimated at approximately 135,000 tons annually. Due to almost steady railroad embargoes against external points, the greater portion of it now is supplied by the New England Gas & Coke Co. The company operates an extensive by-product plant at Everett, Mass., with capacity for producing approximately 400,000 tons a year. The major portion of this output is utilized for domestic and industrial heating and power purposes, but this producer is capable of supplying the entire foundry requirements of the district. Occasionally the New England Gas & Coke Co. sells coke into Canada, New Jersey and New York. A feature of the consumption in New England is that unlike in other sections of the country, very little crushed and stock coke are used for brass furnaces, annealing ovens, coke ovens, etc. For these purposes, coal is the fuel principally employed.

Wire and wire products account for an important share of New England's iron and steel industry; in fact, this section produces approximately 8 per cent of the wire made in this country. Much of it is of special character and is used as raw material for the manufacture of an endless variety of wire products. Perhaps the bulk of the wire consumed in New England is devoted to the production of wire rope, and bolts, rivets and screws. Large tonnages in the aggregate are accounted for annually in the manufacture of beds, bed springs, tacks, all kinds of pins, phonograph needles, bonnet and hat wire and other articles.

The largest steel plant in New England is the South works of the American Steel & Wire Co., at Worcester. This comprises three acid and four basic open-hearth furnaces and one electric furnace, and billet and wire rod mills. The American Tube & Stamping Co., Bridgeport, now has three basic open-hearth furnaces and is building a fourth with capacity of 70 tons; it also has blooming and cold strip mills. The Washburn Wire Co., Phillipsdale, R. I., has three basic open-hearth furnaces and blooming and rod mills. The Tremont Nail Co., West Wareham, Mass., has two basic open-hearth furnaces and blooming and skelp mills. The Aetna Nut Co., Southington, Conn., the Rhode Island-Perkins Horse Shoe Co., Valley Falls, R. I., the Sylvester Co., Danversport, Mass., the Champion Horse Shoe Co., Pawtucket, the Collins Co., Collinsville, Conn., and the Bancroft & Martin Rolling Mills Co., Portland, Me., all have puddling, scrap or busheling furnaces and rolls for making bar iron, principally for their own use. The Coes Wrench Co., Worcester, rolls, welds and forges steel for its own use in the manufacture of knife and die steel. The American Electrical Works, Phillipsdale, has a rolling mill on which it occasionally rolls iron or steel wire rods and hoops. The Penn Seaboard Steel Corp., which last year purchased the plant at New Haven originally erected by the New Haven Wire Co., has rebuilt the two 25-ton open-hearth furnaces there for the production of steel ingots. The output of finished iron and steel rolled products in New England in recent years has been as follows: 1912, 274,811; 1913, 257,386; 1914, 194,444; 1915, 250,728; 1916, 292,700 tons.

Plate consumption in New England accounts for 125,000 to 150,000 tons of the country's output annually, and fully 70,000 tons of the sheet gages are consumed. The consumption of welded tubing is at the rate of at least 100,000 tons a year. At least 30,000 to 40,000 tons of seamless tubing are used annually. The annual consumption of other finished steel products for the whole of New England is estimated as follows: Structural and ship shapes, 125,000 tons; merchant steel bars, 75,000 tons; tack plate, 20,000 tons; tin plate, 25,000 to 50,000 base boxes; and forging billets and bars, 50,000 tons.

New England Rises to Call of War

(*Concluded from page 89*)

suggests an ill-concealed pride for ancestral achievement. The New England executive of 1917 is progressive, but is not the dashing radical whose brilliant coups in the business world make copy for the financial writer. It must be remembered that the New England manufacturer is held down by ties which are unknown to the "uncultured" west. The president of one of New England's long established firms cannot consolidate his interests with those of another concern without dooming to oblivion the proud name of which his father and his father's father devoted their lives. After this fact is realized, the charge of conservatism appears in a different light.

The system of management by which the control of the plant is retained in one family year after year, has been responsible for a remarkable code of business ethics, in which high principles usually are involved. This can be well illustrated by the early history and development of Sargent & Co., manufacturers of builders' hardware, New Haven, Conn. The present business, which gives employment to some 3000 men and women, was started in 1814, when the grandfather of the present president, Henry B. Sargent, conceived the idea of operating a small shop to provide work for his farm hands during the winter months. In a little shop in what is now the town of Leicester, Mass., the elder Sargent and his workmen made cotton cards which, for the most part, were sold in the south. From this small beginning, the hardware business gradually grew to its present size, the management twice passing from father to son.

Business—An Institution

Perhaps the most remarkable feature of this development was the constant accumulation of the elements which constitute the business policy of the company. For instance, in the panic of 1873 when Wall street was hysterical over the condition of the money market, Sargent & Co. continued to operate its plant in spite of the fact that the management was strongly urged to shut down until after the panic had passed. This it refused to do, although it became necessary to shorten the hours of labor in order to distribute the work among all of the employes. Members of the company had to arrange with the banks for the necessary currency to carry them through the crisis, but finally emerged successfully.

When asked if this procedure was not a little bit unusual, Mr. Sargent said: "You must remember that we consider our business an institution and not a money-making proposition. The plant of the company has been operated without interruption ever since it started and the present management feels bound by a sense of obligation to its employes to maintain the reputation that the plant is an institution in which loyal workmen may enjoy permanent employment."

In these few words are traces of the guiding principles of the New England method of conducting business. Tradition and precedent, a high sense of duty to the community, pride in an unstained reputation, and a will to carry to completion the fine deeds of ancestors are unmistakably in evidence. New England—slow but sure, modest yet justly proud, ambitious without being unduly aggressive, and quiet yet patriotic—is rising to the defense of liberty. Let no one say that conservatism has impaired New England's spirit, which measured in deeds, in 1917, has lost nothing since the stirring days of 1776

First to Make Iron Successfully

New England Manufacturers Develop Wide Use of Steel Products

AS THE chief source of supply for cannons, ammunition and other war materials for Washington's continental army, New England's iron and steel industry rendered to its nation the greatest service of its career. Its high rank as a producer in the colonial and revolutionary periods, however, far exceeds its relative position in the present day of steel's commanding importance over iron and of huge quantity output. Lean native ore of moderate supply and a lack of blast furnace fuel have kept the district a comparatively minor one in primary iron and steel production, especially in view of the surmounting influence today of the Superior iron ore ranges and of the western Pennsylvania coal fields in directing the geographical development of the industry. New England today has two active blast furnaces both using charcoal fuel; six open-hearth plants and 14 rolling mills. But what New England has lacked in iron and steel production has been made up in ample measure by its widely varied use of these materials for conversion to useful forms of manufacture. Its machine tool, hardware, textile machinery and miscellaneous industries all are large outlets for iron and steel.

Bog ore, a lean material containing from 18 to 30 per cent iron which was dug from the bottoms of ponds and swamps in various localities was the base for the original iron industry of New England. The first blast furnace to utilize this ore was built within the present limits of Lynn, Mass., by John Winthrop Jr. and associates about 1645. This was the first successful iron plant in the colonies. The fuel was charcoal and water power was used. Another forge or furnace was built at Braintree, Mass., in 1648, and a third near Taunton in 1652. Massachusetts soon became the chief iron center of the colonies. The first Connecticut plant was established near New Haven in 1656. Iron making in Rhode Island began in 1675.

The first slitting mill for slitting nail rods was established in Massachusetts in 1710. Connecticut was the first colony to make cemented or blistered steel. Massachusetts was making this product in about 1750. In 1764 there were 76 iron works in Massachusetts. The pounding of iron bars into nails which was carried on in many households was one of the first finished products of colonial industry. This led to the invention of the Perkins nail machine in 1790 which firmly established a truly American industry.

Following the Revolution, ironmaking and manufacturing in New England declined through lack of support of the struggling government. Further ground was lost in the fluctuating years of the whole American iron industry due to tariff changes and the use of anthracite and bituminous coal in blast furnaces was another development which greatly restrained the growth of the charcoal iron industry.

GEORGE M. WRIGHT
Wright Wire Co.

HARRY W. GODDARD
Spencer Wire Co.

HARRY G. STODDARD
Wyman-Gordon Co.

J. E. V. REYNDERS
American Tube & Stamping Co.

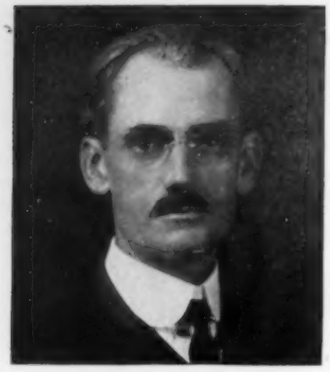
CLINTON S. MARSHALL
American Steel & Wire Co.

C. W. BARNUM
Barnum-Richardson Co.

FRANK L. COES
Coes Wrench Co.

R. H. BOUTWELL
Portland Iron & Steel Co.

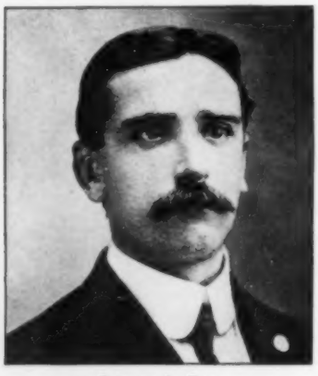
Ranks High in Casting of Metals



T. Raymond Scott
Brown & Sharpe Mfg. Co.

H. Paul Buckingham
Arcade Malleable Iron Co.

C. L. Nutter
Old Colony Foundry



George A. Ray
Taylor & Fenn Co.

Foundries in New England Supplement Plants of Other Industries

NEW ENGLAND, entering its two hundred and seventy-fifth year in the casting of metals, has attained a position in the foundry industry of the United States which bids fair to remain unshaken as long as manufacturing retains its firm grip on the north Atlantic coast. Of the 6000-odd foundries in the country at the present time, over 600, or about 10 per cent are situated in the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

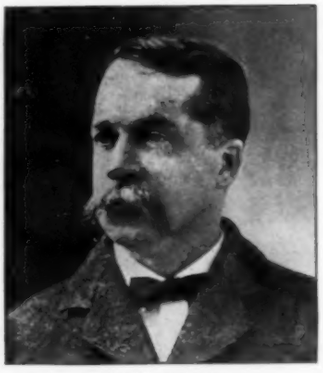
The first iron foundry in America was built on the west bank of the Saugus river, near the present site of Lynn, Mass. According to early records, the village which grew up around the foundry was called Hammersmith, after a town in England from which several of the workmen had come. Joseph Jenks is reported to have cast "a small iron pot, capable of containing about one quart", which is thought to have been the first casting made in this country. The iron was melted from bog ore obtained from the low-lying swamp land in eastern Massachusetts. Hollow-ware was cast as early as 1724 near Taunton, Mass., and in 1725 the foundry was casting hollow vessels varying in size from a pint kettle up to a "10-pail" cauldron.

In general, the majority of the foundries in New England are engaged in casting parts for the machinery which in its turn assists in the manufacture of typical New England products and in providing rough castings from which these products are made. There were 372 casting plants producing gray iron in New England in 1916. Many of these plants are departments of extensive works engaged in the textile, machine tool or hardware business. According to *Penton's Foundry List*, there were 347 brass foundries in New England in 1916, and 229 in which aluminum is melted. Malleable iron foundries in New England in 1916 numbered 18, and of these, 11 were situated in the southwestern part of Connecticut. In 1916 there were only 16 steel casting plants in New England, and 13 of these were in Massachusetts. The electric steel industry is now gaining its first foothold east of the Hudson.

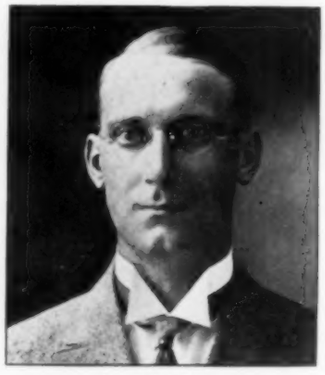
New England foundries are producing their fair share of castings for the government's war needs. The needs of manufacturers of ships, gun mounts, ammunition, wire goods, stoves and other cantonment equipment are creating a demand for castings to which the foundries are nobly responding. In many casting plants a large proportion, and in a few all of the capacity, is engaged in government work directly traceable to the war.

The mid-year period of 1917 finds the foundry industry in an unusually prosperous condition. From various sources of information, it is estimated that there are now 622 casting plants operating in New England.

George H. Gibby
Gibby Foundry Co.



F. B. Farnsworth
McLagon Foundry Co.



Carl S. Dixon
General Electric Co.

Fred F. Stockwell
Barbour-Stockwell Co.

New England a Leader in Hardware

H. C. Noble
North & Judd Mfg. Co.

A. N. Abbe
American Hardware Corp.

A. T. Simonds
Simonds Mfg. Co.

Henry R. Towne
Yale & Towne Mfg. Co.

Has Acquired Excellence in Products Embodying Artistic Designs

IN THE quantity and variety as well as in the serviceability and general excellence of its products, New England has acquired undisputed supremacy in the manufacture of hardware. Especially does it take first rank in these products embodying scientific and artistic design. This is but a modern manifestation of the thoroughness and foresight possessed nearly two centuries ago by the founders of an industry now grown to great proportions.

Connecticut, the birthplace of the American hardware industry, ranks first among the states in the production of cutlery, and manufactures two-fifths of the hardware made in this country. Over 50 per cent of the manufactured output of New Britain, which is the heart of the hardware industry in Connecticut, is of the latter character. Meriden excels in the production of gas and electric fixtures, and Ansonia and Torrington in the manufacture of brass and bronze products. Boston, at least in special lines, is supreme among the cities: its production of cutlery alone is very large. Worcester is an important factor in the industry owing to its prominence in the manufacture of wire which finds an outlet in the making of springs, wire screen and various similar articles. Rhode Island has won recognition because of its development of the industry of filemaking.

Many creative minds stamped themselves upon the struggling industry during its early years. Chief among these were: William and Edward Patterson, emigrants from County Tyrone, Ireland, who were well skilled in the art of shaping tinned sheet iron into small ware; Jacob Perkins of Amesbury, who, recognizing the need for improved nailmaking machinery, in 1790 perfected a machine for cutting and heading nails and thereby established an essentially American art; Hugh Orr, a Scotchman who settled in Bridgewater and started the manufacture of edged tools, and by his inventive genius and ready hand contributed largely to the production of scythes, axles and kindred products; and Linus Yale Jr., inventor of the flat keyed lock, which marked an advance over the old designs.

The localization of the hardware industry in New England responded to the same influences that attracted there other manufacturing enterprises and the expansion and development of this entire group of plants went forward together. A ready supply of raw materials, a steady immigration of skilled mechanics and artisans, and the versatility of the general population together with peculiar marketing facilities, aided materially in the development of these groups. During the colonial period, the business men of New England alone possessed the experience, and its workmen the skill upon which successful manufacturing could be conducted.

L. G. Kibbe
Turner & Seymour Mfg. Co.

Paul B. Morgan
Morgan Spring Co.

L. H. Treadway
Peck, Stowe & Wilcox Co.

Samuel N. Nicholson
Nicholson File Co.

Leadership Since Early Days Justifies N

Great Mechanical Genius Responsible for Rapidly Growing Industry

J. K. Hartness
Jones & Lamson Machine Co.

A. E. Newton
Reed, Prentice Co.

James H. Drury
Lapointe Machine Tool Co.

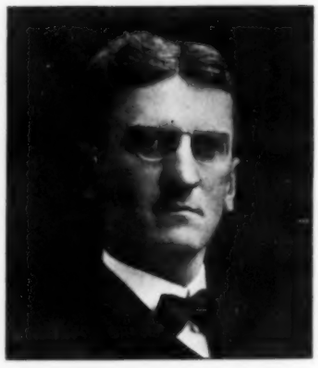
Edward Rivett
Rivett Lathe & Grinder Co.

ROMANCE scarcely would be looked for in so prosaic a subject as machine tools. Yet few topics connected with the upbuilding of the industry of the nation make appeal to the imaginative and patriotic impulses than the rise of American tool building. Founded in the earliest days of rich New England history, the spirit that gave it birth was the same indomitable will to achieve self dependence that fired the original settlers in their quest for political and religious freedom, and later reached its fullest expression in the War of the Revolution. When the pages of history record the early hardships of the colonists, these trials usually are visualized in bloody Indian massacres and sporadic raids. These were the tragic occurrences that marred the peaceful life of the pioneers. Their struggle for a foothold commercially, however, was a greater and more protracted battle. Upon her mechanics who were drawn largely from the farms, New England placed her claim to future industrial greatness. The passing of the years richly has displayed the part which this sturdy stock has taken in the winning of the nation's greatness, politically and commercially.

Pioneers in toolbuilding, as in many other pursuits, early New England manufacturers brought to the new world an art which at that time rapidly was reaching a practical stage in England. Born of necessity the first American-made machine tools scarcely would be entitled to the modern acceptation of the term. Instead, the crude, inaccurate, clumsy and yet for the period, remarkably well-designed types, held little promise of becoming anything more than extreme luxuries of doubtful practical worth, which were available only to few manufacturers.

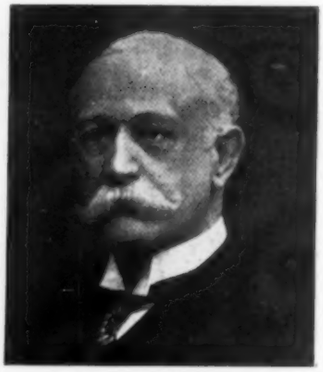
The refusal of parliament in 1785 to permit exports of metalworking machines to the colonies in an effort to stifle industrial progress succeeded instead in giving impetus to "Yankee ingenuity". But "Yankee ingenuity" produced no smooth-working machines to meet the growing need of infant American industry. At that time opinions on labor and time-saving equipment, due to ignorance and prejudice, were anything but favorable to the mechanical minds. Native genius persevered, however. Spurred on by the acute need for equipment for metalworking plants and textile mills, which were fast becoming New England's bulwark in the industrial world, it quickly improved upon English ideas in the production of shop tools. Broad departures from the beaten paths brought initial failure, but determination and resourcefulness finally prevailed and it was not long until the pre-eminence of American methods was recognized abroad. Standardization of gages used in manufacturing plants and the early adoption of a system of interchangeability did much to lift the machine tool building industry

Amos Whitney
Pratt & Whitney



Charles Hildreth
Whitcomb-Blaisdell Machine Co.

Charles E. Van Norman
Van Norman Machine Co.

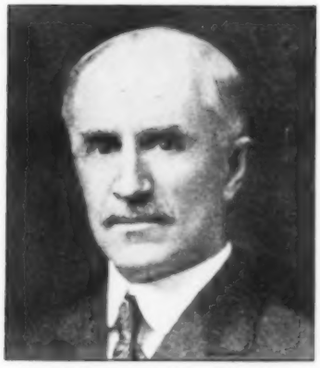


Edward M. Woodward
Woodward & Powell Planer Co.

New England's Pride in Machine Tools

HENRY L. SHARPE
Brown & Sharpe Mfg. Co.

DANIEL M. WRIGHT
Henry N. Wright Mfg. Co.



JAMES N. HEALD
Heald Machine Co.

CHARLES TAYLOR
Taylor & Fenn Co.

to its now recognized position of importance. The names of New England's pilgrims in the machinery field are names to conjure with. Joseph Jenks, 1642; Hugh Orr, 1738; Wilkinson, Brown, Greene, Slater, and a little later David Brown and his son, Joseph R. Brown, founders of Brown & Sharpe, 1833; Eli Whitney, Simeon North, Samuel Colt, George S. Lincoln, Amos Whitney and Francis A. Pratt are only a few of the names that indelibly are written on the pages of the history of tool building in New England and of American industrial progress. The many innovations and improvements which were the product of their hands and skill have stood the acid test of years and have gone down to posterity as a by-word and standard.

There are approximately 200 companies in New England engaged in tool building at the present time. They employ about 50,000 men and represent nearly $100,000,000 of invested capital. They are manufacturers of every type of machine tool from the finest precision measuring machine to the largest boring mills and planers. For the high grade of workmanship and accuracy of design New England plants have built a reputation that never has been surpassed. By no means, however, have they been content to rest on their laurels of early achievements. The production of the semi-automatic, full-automatic and multiple-spindle full-automatic screw machines are the product of their later day inventive genius. There is no type of machine shop equipment which is not to be found today in the product of New England shops.

From 1880 until 1890 the greatest number of toolbuilding plants were formed in New England. From 1900 until 1910 a large number of new enterprises came into existence, and, since the latter date, new enterprises have been frequent. A number of the latest to appear in the field are devoting their entire efforts to the production of machines designed solely for the manufacture of munitions. The period of New England's greatest growth in the machinery field came prior to 1900, but the decade which will end in 1920 bids fair to surpass any other similar period. Three years of war have made tremendous demands upon New England's industries and upon her tool builders in particular, and they have expanded accordingly.

The development of the machinery-building centers of the eastern states and the middle west largely is due to the influence of New England. The great plants whose products have become known the world over have sprung from the knowledge and skill their founders secured in the cradle of machinery building in the United States. Gleason, Warner, Swasey, Henn, Hakewessel, Steptoe, Le Blond, all have come from the shops of New England's foremost tool plants. Through the excellence of their products they in turn have been helping to carry to the very edge of civilization the proof of New England's mastery of mechanical science and inventive skill in the fashioning of metal to man's useful purpose.

MARCUS A. COOLIDGE
Fitchburg Machine Works

WILLIAM C. BUELL
Diamond Machine Co.

CHARLES H. ALVORD
Hendey Machine Co.

WILLIAM A. VIALL
Brown & Sharpe Mfg. Co.

Finest Tools Made in New England

C. E. Billings
Billings & Spencer Co.

A. B. McSkimmon
S. W. Card Mfg. Co.

Bliss C. Ames
B. C. Ames Co.

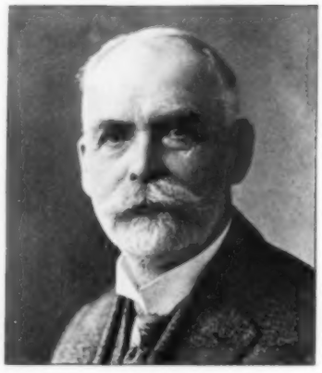
Howard E. Adt
Geometric Tool Co.

Early Mechanics Establish Industry in Athol, Hartford and Providence

THE finest shop tools in the world are made in New England. The industry was started there by brainy men who developed and established it so well that it has not branched out extensively into other sections of the country. The micrometer is probably used more than any other article of the small tool variety, with scales, calipers and wrenches following in their order. The father of the industry is Laroy S. Starrett, president of the L. S. Starrett Co. Athol, Mass., the home of the Starrett plant, is the leading center of the industry in the world. Providence, R. I., with the Brown & Sharpe Mfg. Co., employing nearly 5000 workmen, ranks second, with Worcester and other cities and small towns keeping close pace. About 20 per cent of the business of the Brown & Sharpe Mfg. Co. is devoted to the small tool industry and this is equally true of the Pratt & Whitney Co.

The origin of the small tool industry in New England is still fresh in the minds of men of the older generation. A retired Worcester manufacturer recalls the time when Mr. Starrett started in business in Athol a half century ago. Mr. Starrett, with one or two assistants, began business in one room making scales and calipers. As soon as they completed a few tools, Mr. Starrett started out with them in a market basket on his arm and traveled about New England, selling them to the trade. When sold out Mr. Starrett returned to Athol and made more tools, keeping up this routine until the business increased to such an extent that he gave up traveling and devoted all his time to making the products. Mr. Starrett is a natural born mechanic, showing this genius when but a very small boy. One of his first inventions was the American meat chopper. His first employment in Athol was general agent and superintendent of the Athol Machine Co., which manufactured the tools he invented. After seven years with this company he went into business for himself, making scales, squares, surface gauges, steel rules, calipers and other machinists tools. The growth has been remarkable and today the business requires three factories. From that start other plants sprung up in New England so today there are at least 20 large concerns making small shop tools. Among these are the Simonds Mfg. Co., Fitchburg, Mass., one of the largest makers of saws in the country; Hoggson & Pettes, New Haven, Conn.; the D. & W. Fuse Co., Providence; the Greenfield Tap & Die Corp., Greenfield, Mass.; the Union Twist Drill Co., Athol, Mass.; the Coes Wrench Co., Worcester, Mass.; the Ames Shovel & Tool Co., Boston; the Billings & Spencer Co., and the Pratt & Whitney Co., Hartford, Conn.; the Morse Twist Drill & Machine Co., New Bedford, Mass.; the Geometric Tool Co., New Haven, Conn.; Peck, Stow & Wilcox Co., Southington, Conn.; Brown & Sharpe Mfg. Co., J. T. Slocumb Co., and the Nicholson File Co., Providence, R. I.; S. W. Card Co., Mansfield, Mass.; and the Reed Small Tool Works, Worcester, Mass.

L. S. Starret
L. S. Starret Co.



F. O. Wells
Greenfield Tap & Die Co.

Stephen E. French
Athol Machine Co.

John A. McGregor
Union Twist Drill Co.

Perfects Rolling Mill Machinery

FRANK H. SLEEPER
Sleeper & Hartley, Inc.

V. E. EDWARDS
Morgan Construction Co.

W. C. FISH
General Electric Co.

CHARLES L. NEWCOMB
Dean Steam Pump Co.

New England Important in Manufacture of Mill Equipment

THE New England colonist whose only wealth was the strong arm and the iron will, was forced to rely mainly upon his own unaided exertions to sustain himself. With a sterile soil and a rugged climate, he soon resorted to manufacturing enterprises; and so successfully, that, at the present day, there is scarcely a useful art of modern times in which those who are his lineal successors are not versed and scarcely a region of the globe so remote or inaccessible that it not familiar with the product of their labor.

Since the majority of the nation's industries requiring heavy machinery are located in the central states, it is clear why most of the equipment is manufactured nearby. Still New England is not to be underestimated in this respect, for it ranks as one of the largest producers of rolling mill machinery in this country. This was made possible by the late C. H. Morgan, of Worcester, Mass., who developed the first rolling mill machinery in 1880. Mr. Morgan expanded on his ideas until a continuous rolling mill resulted which has been widely adopted and now is considered standard equipment.

Wire machinery holds a prominent part in industrial New England and credit is especially due to Ichabod Washburn who in 1834 established a wire works and was the first to successfully draw wire by machinery. At this time wire was not made from rods to any extent in this country. What little had been made was of inferior quality, and tended to excite prejudice against the American product. This prejudice Mr. Washburn resolved to overcome and this he did.

The construction of the first nail-cutting machine was ascribed to many persons, among whom were Ezekiel Reed of Bridgeport, Mass., and Jacob Perkins of Amesbury, Mass. The first patent was issued in March, 1795. A machine invented by Caleb Leach, Plymouth, Mass., before 1800, would cut and head 5000 nails per day.

Among the earlier manufacturers of heavy machinery in the New England states were the Globe Works, incorporated in 1854 by John Souther and D. Pickering, which made steam shovels weighing 28 tons, the bucket of which had a capacity of 2 cubic yards and made two dips per minute; the Taunton Locomotive Works, incorporated in 1847, which made the first locomotive that ran west of the Mississippi river; and the Ames Co., established in 1829, at Chicopee, Mass., which manufactured large castings, horizontal turbine wheels and cotton machinery.

Among the lines of heavy equipment being manufactured in New England today are steam hammers, trench diggers, steam pumps, boilers, punches and shears, blowers, steam turbines, gas producers and tannery, pipe cutting, boring, forging, electrical, drilling, wire forming and rolling mill machinery of various types.

EUGENE N. FOSS
B. F. Sturtevant Co.

EDWARD P. ROBINSON
Atlantic Works

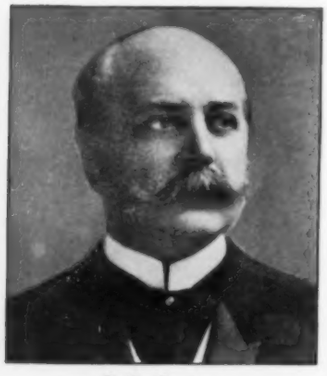
W. S. QUIGLEY
Metals Production Equipment Co.

JEROME R. GEORGE
Morgan Construction Co.

Mark Nation's Industrial Progress

G. Marston Whitin
Whitin Machine Works

George L. Hamilton
Davis & Furber Machine Co.



G. P. Gerhard
Stafford Co.

John F. Tinsley
Crompton & Knowles Loom Works

New England's Position in Textile World Due to Improved Machinery

THE fame of the textile machinery industry in New England extends throughout the world. While the power loom is of English invention, the fancy loom has been developed by American ingenuity and the products of the New England shops are today the standard of the world.

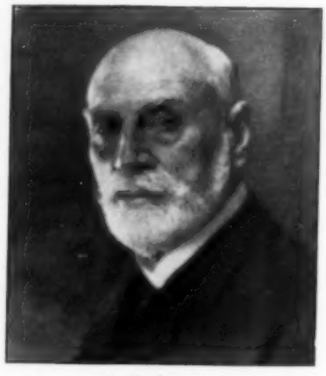
The carpet loom was greatly improved by E. B. Bigelow, Clinton, Mass. Some of his first inventions, which greatly increased the capacity and effectiveness of this machine, were generally adopted in 1855. It was stated that a girl on a Bigelow carpet loom could weave more Brussels carpet in one day than 10 men aided by 10 boys working on handlooms. The so-called self-acting temples were invented by Ira Draper in 1816, but were not introduced into England until 1850.

The woolen industry has been favored with some very important inventions. The rotary shearing machine is unquestionably of American birth and has effected a saving of time in the finishing processes. The American card invented by John Goulding in Worcester, Mass., in 1824, is considered an important development in the woolen industry. The burring picker by which the burr or foreign particles are removed from the wool was invented by Michael H. Simpson of Boston in 1833. Thomas Williams of Newport, R. I., invented the felting machine in 1820. The first and most important invention to be noted is the cotton gin, the invention of Whitney in 1793. It increased the production from four pounds of cotton a day to 70 pounds per day and today 450 to 500 pounds is a common production of the modern machine. The card setting machine is the invention of Amos Whittemore in 1797, and when the renewal of the patent was before congress John Randolph proposed to "renew it to all eternity for it is the only machine which ever had a soul." The ring spinning frame was introduced by John Thorpe, of Providence, R. I., in 1830 and improved by Mr. Mason, of Taunton, Mass.

The Draper Corp., Hopedale, Mass., is the largest maker of automatic looms on light fabrics such as cotton, woolen and worsteds, in the world. The Crompton & Knowles Loom Works, Worcester, Mass., is the largest maker in the world of looms for fancy weaving and heavy fabrics.

The Saco-Lowell Shops, Lowell and Newton, Mass., is the only maker of worsted preparatory machinery and its reputation is world wide. Other important makers of textile machinery in New England are the Whitin Machine works, Whitinsville, Mass.; the Howard & Bullough American Machine Co., awtucket, R. I.; Mason Machine Works, Taunton, Mass.; the Stafford Co., Readville, Mass.; the Universal Winding Co., Providence, R. I.; the Textile Finishing Machinery Co., Providence, R. I.; the Davis & Furber Machine Co., North Andover, Mass.; the James Hunter Machine Co., North Adams, Mass.; the C. G. Sargent's Sons Corp., Graniteville, Mass.

Lucius J. Knowles
Crompton & Knowles Loom Works



J. R. Leeson
Universal Winding Co.

Charles H. Hutchins
Crompton & Knowles Loom Works

George S. Barton
Rice, Barton & Fales Machine & Iron Co.

THE IRON TRADE REVIEW

Vol. LXI Cleveland, September 20, 1917 *No. 12*

Industry Awaits President's Word

Chief Interest Among Buyers and Sellers Still Centers in Government Price Action and Market Continues to Drift—War Buying Goes on Briskly—Easier Prices Grow in Many Lines

TALK at Washington that some announcement of the government's long-awaited price plan in iron and steel is near at hand finds the industry in a highly receptive mood. So much emphasis, properly or otherwise, has been put upon the forthcoming action that final announcement is necessary to clear the air and to restore some measure of normal conditions to a confused situation.

In the meantime increase in absorption of mill capacity by the government needs goes on steadily. As prospects for even greater demands are appearing, the opportunities of private buyers to fill their wants have been narrowing. With various mills, especially those in the lines where the demand is the heaviest, the acceptance and shipment of virtually every order awaits upon official government approval. As it is, conflicts even of government orders from different departments and with requirements of the allies are not infrequent. Signing of contracts for the three great government-controlled shipyards brings nearer the time when these large additions to consuming capacity must be accommodated by the already-pressed plate mills. The virtually unending character of the ship program is shown by the more than a billion dollar increase for shipping board use carried by the urgent deficiency bill. Munition steel buying for the government has loomed large. Current estimates place the tonnage in sight as 1,500,000. One lot of 40,000 tons of shell steel has been allotted, at a reported price of 4.50c, mill. For French camps, 11,000 tons of black sheets have been bought at 6.50c, mill.

Steel Prices Grow Easier

Some loosening of the long-prevailing tight conditions of rolled steel prices continues. Resale lots are figuring in some of these cases, but a number of the producers also are freer with concessions from the virtually premium prices which they have been asking. Most of this business is being done on odd and end lots and it is to be noted that heavy tonnages still command relatively firm prices. A sale of 60,000 tons of sheet bars for 12 months' delivery in the Mahoning valley at $90, mill, is of significance. Early plates have been quoted in the east at 7.50c, which is lower than anything that yet has appeared. Of much importance in the plate market is the resumption of shipments to Japan, which has been the principal foreign customer, by the issuance of export licenses. Spot lots of sheets have brought out lower prices, such as 7.75c, Pittsburgh, for No. 28 black. Early steel bars can be had below former quotations. Shapes also show an easier tone. The lower prices in structurals, however, are not bringing out much more building work. The steady decline in awards is displayed by the 38 per cent tonnage of August orders.

Resale Iron Cuts Prices

Resale iron continues thoroughly to dominate the market. The extent of this is shown by a sale of 2000 tons of basic by a Shenango valley steelmaker, from surplus stock, at $42, valley. Against this apparent cut of $6 from the nominal open market are quotations of $50, valley, by makers on a new inquiry for 4000 tons of basic. The seller of the 2000-ton lot is offering 14,000 tons additional. Lower resale bessemer prices also are appearing. Some of the tonnage bought for Italy in eastern territory is said to figure about $45, valley equivalent. With the furnaces heavily sold and falling further behind in deliveries, and with buyers indifferent to new purchases because of price-regulation talk, the market shows little resisting power. Apparently much depends as to prices just at this time whether a sale is forced or grows out of a voluntary inquiry.

Further furnace coke contracts have been closed at the flat prices of $8 and $8.50, ovens, on sliding scale arrangements based on pig iron. No further light has been thrown on the price-fixing plan at Washington. The tentative advance payments of $3 for furnace and $3.50 for foundry grades to the navy department will be a part of the official prices when they finally are named.

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Take Advantage of War's Lessons

IN THE tragic paradox, "Save men from industrial accidents so they may be fit for the trenches," lies the keynote of the proceedings at the sixth annual Safety Congress in New York last week. The stern necessities of war were brought home by a great many speakers. At the same time it was pointed out how many of the surgical lessons learned in the great struggle across the ocean can be applied to the treatment of industrial injuries. This applies particularly to the Carol-Dakin treatment of infected wounds and to the newly-developed method of dressing burns with paraffine substances. Combinations of the Carol-Dakin and paraffine treatment also are possible with very satisfactory results in case of third degree burns. Such burns, it was pointed out, seem unavoidable under present conditions in the iron and steel industry. The only correct way to solve the problem, of course, is to remove the causes of accidents, but until this can be accomplished it is fortunate that improved methods of treatment are available. Severe third degree burns can now be healed in half the time formerly required with much less discomfort to the patient. Also the paraffine dressings seem to prevent the formation of scars which are often more disfiguring than the loss of a limb.

Why Business is Waiting

ONE of the most prominent investment bankers in the country, commenting upon the present lack of snap and energy in the conduct of business for other than war purposes, says that general business, like the stock market, is drifting along without much leadership. "Consider the large number of men," he said, "at the head of their respective lines of business, whose services have been commandeered for war purposes. The great constructive brains of the country are today intent on war and not on business. War, not money making or the building up of new enterprises has become the business of the country." Of course a vast volume of business must be transacted to take care of the needs of our 100,000,000 inhabitants, but the zest seems to have disappeared from business, with the holding in abeyance of that great constructive force, the determination to increase and develop. Capital is reluctant to embark upon new enterprises, for it does not know whether "wealth conscription" and price fixing will proceed to a point which will deprive investments of a satisfactory yield. The risks at present seem too great for progress along any of the staple lines outside the munitions field. One of the most depressing influences of all is the stupendous sums into which the cost of war is mounting. The way congress bandies billions is appalling. But, no doubt, after a few prices have been fixed, and manufacturers and merchants have been given an opportunity to see how effective the policy will be, a more active business may ensue. Forward buying has been held up for about two months, until now there are requirements to be covered in many lines which are mounting to considerable proportions.

To Help the Food Campaign

TO THE casual observer it would appear that the steel industry is already doing all that could be expected of it in the prosecution of the war. As a matter of fact, however, it is daily adding to its burden of war business and to the credit of its leaders, it should be pointed out that each new task is accepted cheerfully and prosecuted vigorously, regardless of its effect in dislocating the long-established routine of the trade. One of the latest efforts of the steel industry to assist the government is in connection with the food conservation campaign. A meeting of tin-plate manufacturers was held in Pittsburgh a week ago solely for the purpose of speeding up the production of tin plate for manufacture into containers for perishable food. In order to increase the amount of tin plate available for this purpose it was decided to limit sales to jobbers as much as possible. The manufacturers attending the conference were unanimous in their expression of their desire to meet the requirements of the government fully and completely. The leaders in the steel trade realize that the food conservation program will become one of the decisive factors in the war. The Pittsburgh meeting was more than ordinarily significant in that it demonstrates again the unique pivotal position which the iron and steel industry occupies in the present emergency.

Controlling a National Menace

IN ORDER to stimulate American manufacturers to greater effort to avoid fires, the National Board of Underwriters has mailed out 66,000 copies of a booklet entitled "Safeguarding Industry". The booklet points out that most fires originate through sheer carelessness, and lays down a set of safety rules.

This latest action of the board of underwriters ought once again to awaken every manufacturer to the danger from fire. The words of President Wilson

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EDITORIAL

show how gravely fire loss at this time is regarded by the government.

"Preventable fire is more than a private misfortune. It is a public dereliction. At a time like this of emergency and of manifest necessity for the conservation of national resources, it is more than ever a matter of deep and pressing consequence that every means should be taken to prevent this evil."

Statistics compiled by the board of underwriters prove that our efforts for increased output are causing us to neglect our safety rules. The per capita fire loss increased from $1.71, in 1915, to $2.10, amounting to $214,000,000 in 1916. What is America going to do about her per capita fire loss for 1917? More specifically, what are you going to do? If we are to come out of this war successfully, efficiency must be developed to the highest possible point, and efficiency consists in conservation as well as production.

Day-to-Day Uncertainty

"THE market continues uncertain pending price-fixing developments at Washington." The reader of iron and steel market reports knows this statement by heart. Its triteness is brought home to him in his business every day. How much longer the affairs of the trade must hang in suspense seems just now as uncertain as the condition itself. For some months past it has been the general sentiment that there would be no important buying of any of the iron and steel commodities until sellers knew just what to expect from Washington. But how long can the general buying movement be withheld, "pending price-fixing developments?" Will the price question be determined one way or the other before buying becomes imperative?

Last week the government sent broadcast to manufacturers the country over a request for more data concerning costs of operation, etc. Extensive additional information supplemental to that already in the hands of the federal trade commission was requisitioned. Presumably it will take at least a week or two to place all this data in the hands of the commission, and it will take the commission perhaps longer to digest it and reach conclusions. The iron and steel markets, more so than most large markets, cannot indefinitely be permitted to remain inactive. Buying and selling of raw, semifinished and finished materials are the alternating currents that transmit motive power to the trade and give it life and action. Can the market stand another month or so of inanition while the price question is given further study by the government? It does not seem possible.

Spot buying, with its attendant nervousness and day-to-day changes and uncertainties, already is taking the place of the general contract buying seasonal at this time of the year. And it seems that an indefinite hand-to-mouth existence is the only condition in sight—"pending price-fixing developments at Washington."

Trade Acceptances Popular

THE growing popularity of trade acceptances, as provided in the federal reserve act of 1913, is indicated by the fact that they are being used more freely by big iron sellers. No doubt after this form of commercial paper is better understood by the trade the facilities it provides for making assets more liquid will be appreciated and its use, therefore, promises to become the common thing within a reasonable time. The medium is a most convenient one, both for the seller and the buyer and also one that supplies inducements for the banker. Modern business, particularly in these days when financial turnovers are being made in great volume, calls for this kind of financial circulation.

War the Spur to Activity

WAR as a spur on the productive ability of the country is bringing some surprising results. In every department new records are being made except in the production of some raw materials where labor, fuel and transportation difficulties are the limiting factors. An example illustrative of what is being done, is found in the vastly enlarged output of the Baldwin Locomotive Works. Two years ago this concern prided itself on turning out a locomotive each day, 30 a month. Recently nine complete locomotives a day were turned out during a week and this rate is being maintained. With changes and betterments under way this is expected to be increased until 225 a month will be built. These are large locomotives, suitable for the heaviest class of traffic, the entire resources of this company being devoted to this class of construction.

Given the incentive, whether it be of profit or service to the government, manufacturing facilities in times of peace can be enlarged greatly in the face of immense difficulties. In time of war the increase seems to be made even more rapidly, as results on every hand point out.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 628

PIG IRON

(Delivery this year.)

Bessemer valley	$51.00
Bessemer, Pittsburgh	51.95
Basic, Pittsburgh	48.95
Basic, eastern Pa.	50.00 to 52.00
Basic, Buffalo	54.00 to 55.00
Malleable, Pittsburgh	54.95
Malleable foundry, Chicago	55.00
Malleable foundry, Phila.	55.00 to 56.00
Malleable foundry, Buffalo	53.00 to 55.00
No. 1X, Phila.	53.00 to 55.00
No. 2 foundry, Pittsburgh	52.95
No. 2 foundry, Cleveland	54.00 to 55.00
No. 2 foundry, Ironton	54.00 to 55.00
No. 1 foundry, Chicago	56.00
No. 2 foundry, Chicago	55.00
No. 2X foundry, Phila.	50.50 to 53.50
No. 2X foundry, N. J. tide	50.75 to 53.75
No. 2X foundry, Buffalo	53.00 to 55.00
No. 2 plain, Philadelphia	49.50 to 51.50
No. 2 plain, N. J. tide	49.75 to 51.75
No. 2 plain, Buffalo	52.00 to 54.00
No. 2 southern, Birmingham	47.00 to 49.00
No. 2 southern, Cincinnati	49.90 to 51.90
No. 2 southern, Chicago	50.00 to 54.00
No. 2 southern, Phila. del.	51.50 to 52.50
No. 2 southern, Cleveland	51.00 to 52.00
No. 2 southern, N. Y.	51.25 to 52.25
No. 2 southern, Boston	52.00 to 53.00
No. 2 south. interior, N. E.	53.00 to 54.00
No. 2 southern, St. Louis	48.50 to 52.50
Virginia, No. 2X, furnace	51.00
Virginia, No. 2X, Phila.	53.75
Virginia, No. 2X, Jersey City	54.00
Virginia, No. 2X, Boston	54.25
Gray forge, eastern Pa.	44.00 to 46.00
Gray forge, Pittsburgh	52.95 to 53.95
Gray forge, Birmingham	45.50 to 46.00
Silveries, 8 per cent, furnace	80.00 to 85.00
Silveries, 8 per cent, Chicago	85.00 to 92.50
Low phos. standard, Phila.	90.00 to 92.00
Low phos. Lebanon furnace	80.00
Low phos., Pittsburgh	82.00 to 85.00
Charcoal, Superior, Chicago	59.50 to 62.00
Charcoal, Superior, Buffalo	55.00 to 60.00
Charcoal, Birmingham	55.00 to 60.00

COKE

(At the ovens.)

Connellsville furnace	$12.50 to 13.00
Connellsville furnace, contract	10.00
Connellsville foundry, contract	12.50
Connellsville foundry	13.00 to 14.00
Wise county furnace, contract	10.00 to 11.00
Wise county foundry, contract	11.50 to 12.00
Pocahontas furnace, contract	10.50 to 11.00
New River foundry, contract	13.50 to 14.00
New River furnace, contract	8.50 to 10.00

FERRO ALLOYS

Ferromanganese, prompt	$375.00
Ferromanganese, last quar.	375.00
Spiegeleisen, 20 per cent furnace, remainder of year.	80.00
Ferrosilicon, 50 per cent, Pitts.	200.00
Ferrosilicon, 50 per cent, Pitts., 1st quarter	140.00 to 150.00
Bessemer ferrosilicon, 9 per cent	$94.00
Bessemer ferrosilicon, 10 per cent	95.00
Bessemer ferrosilicon, 11 per cent	97.50
Bessemer ferrosilicon, 12 per cent	100.00
Bessemer ferrosilicon, 13 per cent	105.00

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O., furnaces.

SEMI-FINISHED MATERIAL

BILLETS

Open hearth, Pittsburgh	$70.00
Open hearth, Philadelphia	90.00 to 100.00
Open hearth, Youngstown	90.00
Bessemer, Pittsburgh	70.00
Bessemer, Youngstown	80.00 to 85.00
Forging, Pittsburgh	125.00
Forging, Philadelphia	115.00 to 125.00
Forging, Chicago	125.00

SHEET BARS

Open hearth, Pittsburgh	$80.00
Open hearth, Youngstown	90.00
Open hearth, Cleveland	90.00 to 95.00
Bessemer, Pittsburgh	80.00
Bessemer, Youngstown	90.00

WIRE RODS, MUCK BAR, SKELP

Wire rods, Pittsburgh	$90.00
Muck bar, Pittsburgh	85.00 to 90.00
Grooved skelp, Pitts., nom.	4.00c to 4.50c
Sheared skelp, Pitts., nom.	4.50c to 5.00c

SHAPES, PLATES AND BARS

Structural shapes, Pitts.	4.00c to 6.00c
Structural shapes, Phila.	4.685c to 5.185c
Structural shapes, N. Y.	4.695c to 5.195c
Structural shapes, Chicago	4.94c to 6.19c
Tank plates, Chicago	8.69c to 10.19c
Tank plates, Pittsburgh	8.00c to 9.00c
Bars, soft steel, Pittsburgh	4.00c to 5.00c
Tank plates, Philadelphia	8.185c to 10.185c
Tank plates, New York	8.169c to 10.169c
Bars, Pbgh., 1918 del.	3.50c to 4.50c
Bars, soft steel, Chicago	4.50c
Bars, soft steel, New York	4.445c to 4.695c
Bars, soft steel, Phila.	4.435c to 4.685c
Cotton ties, Pitts., Sept.	$2.12
Bar iron, Chicago	4.50c to 5.00c
Bar iron, Philadelphia	4.685c to 5.185c
Bar Iron, Cleveland	4.50c to 5.00c
Bar iron, New York	4.695c to 5.195c
Bar iron, Pittsburgh	5.25c
Hard steel bars, Chicago	4.25c to 4.50c

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh, base	3.75c to 4.00c
Angle bars, Chicago, base	3.25c to 4.00c
Standard bessemer rails, mill	$38.00
Stand. open hearth rails, mill	40.00
Light rails, 25 to 45 lbs., Chic.	70.00
Light rails, 25 to 45 lbs., Pitts.	75.00 to 85.00
Relayers, standard, mill	38.00 to 40.00
Relayers, light, Chicago	60.00
Relaying rails, light, St. L.	62.00 to 65.00
Spikes, railroad, Pittsburgh	6.50c to 7.00c
Spikes, railroad, Chicago	5.00c to 5.25c
Track bolts, Pittsburgh	5.50c to 8.00c
Track bolts, Chicago	5.25c to 6.50c
Tie plates, Chicago	$70.00 to 75.00

WIRE PRODUCTS

(Prices of independent makers.)

(To jobbers; retailers 5 cents more.)

Wire nails, Pittsburgh	$4.00
Coated nails, Pittsburgh	4.00
Plain wire, Pittsburgh	3.95
Galvanized wire, Pittsburgh	4.65
Polished staples, Pittsburgh	4.15
Galvanized staples, Pittsburgh	4.85
Barb wire, painted, Pittsburgh	4.15
Barb wire, galvanized, Pitts.	4.85
Cut nails, Pittsburgh	4.50

CHAIN, PILING, STRIP STEEL

Chain, ⅜ in. proof coil, Pitts. 9.00c

Sheet piling, base, Pittsburgh 4.00c to 5.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 9.00c to 9.50c.

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SHEETS

(In cents per pound.)

SHEET MILL BLACK.

No. 28, open hearth, Pitts.	9.00c to 9.50c
No. 28, bessemer, Pitts.	9.00c to 9.50c
No. 28, open hearth, Chic.	8.94c to 9.19c

TIN MILL, BLACK

No. 28, open hearth, Pitts.	9.00c to 9.50c
No. 28, bessemer, Pitts.	9.00c to 9.50c

GALVANIZED

No. 28, open hearth, Pitts.	10.25c to 11.50c
No. 28, bessemer, Pitts.	10.25c to 11.50c
No. 28, open hearth, Chic.	10.19c to 10.69c

BLUE ANNEALED

No. 10, open hearth, Pitts.	8.50c to 9.00c
No. 10, bessemer, Pitts.	8.50c to 9.00c
No. 10, open hearth, Chic.	8.69c to 8.94c
No. 10, open hearth, Phila.	8.185c to 9.185c

TIN PLATE

(Per 100 lb. box.)

Tin plate, coke base, nom. $10.00 to 15.00

IRON AND STEEL PIPE

(Prices adopted June 18, 1917.)

Steel

Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
¼ to 3, butt	42	28½

Iron.

(Prices adopted June 30, 1917.)

Diameter in inches.	Black. Per cent off.	Galv. Per cent off.
¼ to 1½, butt	33	17

BOILER TUBES

(Price adopted April 2, 1917.)

Steel, 3½ to 4½ inches, l. c. l.	34
Iron, 3½ to 4½ inches, l. c. l.	28

CAST IRON WATER PIPE

(Class B Pipe.)

Four-inch, Chicago	68.50
Six-inch and over, Chicago	65.50
Four-inch, New York	68.50
Six-inch and over, New York	65.50
Four-inch, Birmingham	58.00
Six-in. and over, Birmingham	55.00

Class A pipe is $1 higher than Class B.

HOOPS, BANDS, SHAFTING

Hoops, Pittsburgh	6.00c to 6.50c
Bands, Pittsburgh	6.00c to 6.50c
Shafting, Pittsburgh, carloads	5 off to list

RIVETS

Structural rivets, Pittsburgh	5.25c
Boiler rivets, Pittsburgh	5.35c
Tinner's rivets, Pittsburgh	40 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius.)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter.)

Rolled thread	40 off
Cut thread	35 and 2½ off
Larger or longer	25 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts.)

Rolled thread	40 and 10 off
Cut thread	40
Larger and longer	30
Cold pressed, semi-finished, hexagon nuts	50, 10 and 5
Gimlet and cone point lag bolts	40 and 10

NUTS

Hot pressed, square, blank	1.10 off
Hot pressed, square, tapped	1.90 off
Cold pressed, square, blank	1.50 off
Cold pressed, square, tapped	1.25 off
Hot pressed, hexagon, blank	1.90 off
Hot pressed, hexagon, tapped	1.70 off
Cold pressed, hexagon, blank	1.50 off
Cold pressed, hexagon, tapped	1.25 off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products September 19, average for August, 1917, average for June, 1917, and average for September, 1916. Prices are those ruling in the largest percentage of sales at the dates named

	Prices Sept. 19, 1917.	Average prices Aug., 1917.	June, 1917.	Sept., 1916.
Bessemer pig iron, Pittsburgh..	$51.95	$55.55	$55.20	$22.20
Basic pig iron, Pittsburgh.....	48.95	52.25	50.20	19.075
No. 2 Foundry pig iron, Pitts..	52.95	55.55	51.025	19.50
No. 2 Foundry pig iron, Chic...	**55.00**	55.00	51.00	18.62
Lake Superior Charcoal, Chicago	59.50	59.50	51.80	19.75
Malleable, Chicago	55.00	55.00	56.50	19.12
Southern, No. 2, Birmingham..	47.00	48.00	35.75	14.38
Southern Ohio No. 2, Ironton..	55.00	55.00	38.60	18.25
Basic, eastern Pa.....	51.00	51.00	46.75	20.00
No. 2X Virginia, furnace.....	51.00	51.90	46.50	17.50
No. 2X foundry, Philadelphia..	52.00	53.40	47.50	19.75
Ferro mang., delivered.....	375.00	400.00	431.25	164.00
Bessemer billets, Pittsburgh....	70.00	93.00	93.75	45.00
Bessemer sheet bars, Pittsburgh	80.00	96.00	101.25	45.00
Open hearth sheet bars, Pitts..	80.00	96.00	101.25	45.00
Open hearth billets, Pittsburgh.	70.00	93.00	93.75	45.00
Steel bars, Pittsburgh.....	4.00	4.00	3.625	2.60
Steel bars, Chicago.....	4.50	4.50	4.50	2.79
Iron bars, Philadelphia.....	4.935	4.914	4.259	2.659
Iron bars, Cleveland, local del'y	4.75	4.75	3.50	2.40

*Seaboard.

	Prices Sept. 19, 1917.	Average prices Aug., 1917.	June, 1917.	Sept., 1916.
Iron bars, Chicago mill.....	$4.50	$4.50	$4.00	$2.35
Beams, Chicago	6.19	4.94	4.63	2.79
Beams, Pittsburgh contract.....	4.50	4.50	4.00	2.60
Beams, Philadelphia	4.685	4.914	4.659	2.759
Tank plates, Pittsburgh.....	8.00	8.80	4.50	2.95
Tank plates, Chicago.....	10.19	9.59	7.92	3.19
Tank plates, Philadelphia.....	8.685	10.164	9.659	3.909
Sheets, blk., No. 28, Pittsburgh	9.00	9.00	8.137	2.887
Sheets, blue anld., No. 10, Pitts.	8.50	8.50	5.575	2.925
Sheets, galv., No. 28, Pittsburgh	10.25	10.25	9.95	4.225
Wire nails, Pittsburgh.....	4.00	4.00	3.625	2.60
Connellsville fur. coke, contract.	**10.00**	10.00	8.50	2.487
Connellsville fdy. coke, contract.	**12.50**	12.75	10.875	3.175
Heavy melting steel, Pittsburgh	36.00	34.60	40.00	16.125
Heavy melting steel, eastern Pa.	31.50	32.80	36.625	15.00
Heavy melting steel, Chicago...	33.00	33.10	37.00	15.50
No. 1 wrought, eastern Pa.....	44.50	46.24	47.875	21.00
No. 1 wrought, Chicago.....	37.00	35.00	41.75	16.62
Rerolling rails, Chicago.....	41.00	41.90	46.00	16.87
Car wheels, Chicago.....	31.00	30.70	37.00	12.00

(For Additional Prices See Page 628)

Resale Basic Drops to Low Point

Lot of 2000 Tons Remarketed by Steel Manufacturer at $42, Valley—More Tonnage Offered—Furnaces Quote $50, Valley, on Voluntary Inquiry—Resale Iron Generally Dominates Trading—Government Places Shipping Orders

Pittsburgh, Sept. 18.—A manufacturer in the Shenango valley today sold 2000 tons of basic iron to a dealer in the Pittsburgh district at $42, valley. Special conditions surround this transaction as this lot is a portion of 16,000 tons which this manufacturer acquired last spring when he took over a plant in the Youngstown district. It is not known whether any other parcels of this lot have been sold, but the holder is disposed to market this iron at this time in order to cut down his stock. Further lots now are being offered on the market. The price at which the 2000 tons was sold is $6 below what has been regarded as the prevailing level. These resale offerings tend to obscure the true strength of the situation for with the furnaces having little to sell and buyers awaiting government action, the iron in third hands is thoroughly dominating the market. Something of the furnace side of prices is shown by quotations of $50, valley, on a new inquiry for 4000 tons of December-March basic which has been put out by an Illinois melter. Lower reports on bessemer prices also are current. The portion so far closed of the 40,000-ton inquiry for Italy put out through the United States government, and amounting to perhaps 25,000 tons, was purchased from eastern furnaces at a price reported to be the equivalent of about $45, valley. Several lots of No. 2 foundry ranging from 100 to 500 tons have been sold in this district during the past week, the prevailing figure commanded being $52, valley. Small lots of No. 3 and No. 4 foundry have been sold at $50 and $51, valley. Fair sized tonnages of bessemer have been sold at the prevailing quotation of $51, valley, for prompt shipment and small lots of malleable have also been sold at $54, valley, for prompt delivery. Reports have been heard of both bessemer and No. 2 foundry iron being sold at slightly below the prevailing market quotations, but these sales are said to have been of a resale character. One sale involving a fair sized tonnage of bessemer at $52, valley, or $1 over the prevailing level, is reported.

Buffalo Market Lifeless

Buffalo, Sept. 18.—Most of the lifeless characteristics of last week's market are in evidence this week, with few new developments. Most melters appear to be covered for the last half and there is little inquiry with the exception of one furnace producing basic. This maker reports plenty of inquiry but no response on its part, due to its sold-up condition. Some small tonnages of No. 2 foundry were sold at $53 and malleable at $53 to $55. The rest of the iron sold was principally resale, which the buyers of six months ago now find can be turned into cash and at a better rate of profit than would accrue from the melting of the iron and subsequent sale. Dealers say the market will continue to remain as now until the price regulation talked of by the government actually comes to pass.

More Inquiry Appears

Philadelphia, Sept. 17.—Small sales remain the one evidence of activity in the eastern Pennsylvania pig iron market. Inquiries from domestic consumers, however, have been a little more liberal and it remains to be shown what figures these will bring out from the producers since up to this time the latter have been putting out few

voluntary requests for prices. Prices gradually are working lower and resale offerings are having a major influence in this. The largest sale of the week was a few hundred tons of foundry to the Southern railroad. Two eastern Pennsylvania consumers have inquired for 500 tons of malleable each, and a New York state buyer wants 2000 tons of the same grade for October-November delivery. There are also inquiries in the market for 3000 and 1500 tons, respectively, of low phosphorus iron from two eastern consumers. One eastern Pennsylvania maker has offered No. 2X at $50, furnace. The spread of the eastern Pennsylvania market now is considered from $50 to $53, furnace, for No. 2X. Virginia foundry is held at from $50 to $51, furnace, for No. 2X. A small tonnage of bessemer was sold in the week at the equivalent of $56, Philadelphia.

Basic Lot Inquired For

Cleveland, Sept. 18.—About the only domestic pig iron inquiry of importance to appear in this district is 4000 tons of basic for December-March delivery for a consumer in Illinois. Producers have quoted $50, valley, on this business. The placing of business considerably under this price continues to be reported, but this apparently is restricted to resale lots. As a rule, the furnaces are not bidding for new business and are leaving the determination of the market to such lots as are being forced to find purchasers. The indifferent position of the furnaces is strongly influenced by their backwardness on deliveries. There is scarcely a producer who is not several weeks or more behind on his orders and apparently still losing ground. On a new export inquiry for 10,000 tons of bessemer, $53, valley, was named. Foundry iron is held at around $52, valley, or $52.95, Cleveland, with sales being limited to carloads. On a Canadian transaction 300 tons of spot foundry were placed at $58, furnace. Small sales of Virginia No. 2X at $50, furnace, or $53.20, Cleveland, are being closed. Bessemer ferrosilicon shows no sales but is easier and $80, southern Ohio furnace, for 8 per cent now is recorded as the market. Formal shipping instructions are being received by the furnaces for their allotments of foundry iron under the recent orders placed by the navy department and the Emergency Fleet Corp. Delivery on this is called for in from 60 days to through the first quarter of 1918.

Chicago Iron Inactive

Chicago, Sept. 18.—Practically no selling of pig iron by either northern or southern furnaces is being done at present. Makers are sold through first half of 1918 and under the conditions of fuel supply are falling behind on deliveries. At the same time, melters are keeping out of the market, apparently awaiting the possible fixing of prices at lower levels. About the only business at present is in resale iron and occasional car lots on the part of furnaces desiring to favor regular customers. Off iron is being disposed of readily at concessions. More of this grade is being made now than usual. The situation as to specialties, silveries and charcoal iron, remains unchanged and quotations are the same as have prevailed for several weeks. Nominally the quotation by northern furnaces on No. 2 is $55, Chicago, and this figure applies on carloads. Southern furnaces practically have no price and resale iron has been sold in Chicago recently as high as $50, Birmingham. It is understood some sellers of resale iron have taken considerably lower figures in order to move the material promptly.

Offer Resale at Concessions

Cincinnati, Sept. 17.—Southern resale iron in small lots is being offered a little more freely. Some iron which already has been shipped also is being offered below the schedule and in order to dispose of these few cars to avoid demurrage, it is rumored that attractive prices have been named. As far as the furnaces are concerned $47, Birmingham basis, is considered minimum, and some foundry brands are bringing $48 and higher. An order for more than one or two cars is a rarity. The foundrymen are using more scrap than heretofore and to some extent this cuts off the demand for spot foundry iron. Ironton furnace operators are hard put to make shipments on time, and very little iron of any kind can be purchased in that district for this year's shipment. Probably malleable is an exception, and $54, Ironton, for this year is understood to be the prevailing price. For the first half of next year as low as $51 has been named, but $53 is the general quotation for that shipment. Virginia No. 2X has lately been sold in this vicinity around $50 at furnace. The silvery irons are not in demand and prices are unchanged.

Resale Offerings Less Liberal

St. Louis, Sept. 18.—While dull, the market for pig iron here continues extremely uneven and feverish. A canvass of leading dealers and consumers developed a rather wide price range and great diversity of opinion. One peculiar feature is that in some instances offers by brokers are more reasonable than producers' quotations. This is due to resale iron, small tonnages of which appear from time to time. During the past week, though, less of this material has shown up, and there is every indication that the supply has been about exhausted. There are no large inquiries before the market, the demand at the moment being for small lots, ranging from a carload to 400 to 500 tons. A manufacturer in the East St. Louis district took 300 tons early in the week, paying $51.40, delivered, but sales were heard of $1 lower to $1 higher than this figure. Virtually all the furnaces which supply this market are holding No. 2 foundry at from $48 to $50, Birmingham, for prompt, or delivery this year. The former figure is freely quoted for the first half of next year, but business for delivery that far ahead is extremely light. Some dealers say there is less buying ahead now than at any similar period since the war started. This, and the general irregularity of the situation, is attributed to the failure of the government to announce what it is going to do. There is no let-down in consumption.

Deliveries Delayed in South

Birmingham, Ala., Sept. 18.—Pig iron manufacturers in the south are making strenuous efforts to catch up on deliveries on old contracts. Production, however, is off somewhat because of intra-district transportation difficulties. The market is firm at $50 per ton for No. 2 foundry and basic, for this year's delivery, and at $48 for next year. Only a few sales of iron are being made, but the manufacturers are not disturbed. Apprehension is diminishing that government control will affect the market as orders on hand will require steady production for some time to come. There is very little iron to be offered for this year and the probable make for the first three months of 1918 has been well taken up. Even if the government fixes a price under that now in effect, it is hardly believed that consumers will take much chance in cancelling contracts, because of the uncertainty that they would be able to replace this tonnage. The presence in the district of representatives of some of the larger melters is considered significant, indicating that important consumers actually need iron. Inquiries are reported which indicate that on the granting of concessions a considerable tonnage would be purchased. Manufacturers are not inclined to listen to such requests. Further reductions of stocks of iron are noted. Premiums

are being paid for special analysis iron in small lots.

Italy Buys Bessemer

New York, Sept. 18.—Pig iron sales this week include a huge tonnage of bessemer by an eastern maker, 5000 tons of basic by a Pennsylvania maker, 500 tons of No. 2X for first half to a melter in this district and numerous small lots of foundry mainly for prompt shipment. Altogether, these transactions comprise more activity than has been witnessed here for many weeks past. There is a considerable improvement in new inquiries. Two eastern steel foundries want low phosphorus for first half, one 5000 tons and the other 2500 tons. This business is expected to be closed without delay. A railway equipment maker wants 500 to 700 tons of basic, high phosphorus foundry and No. 2 for early shipment to a Pittsburgh plant.. Several inquiries for malleable are current. The market on No. 2X now is $50 to $53, eastern Pennsylvania; bessemer and eastern Pennsylvania, basic, $50, malleable, around $55, eastern furnace, eastern Pennsylvania; low phosphorus, $80, furnace; standard low phosphorus, $87 to $90, furnace. New export inquiries involve 2000 tons of foundry and 2000 tons of bessemer for Italy.

The Brown Specialty Machinery Co. has completed its removal to new quarters at 2528-2540 West Forty-eighth place, Chicago.

Coke Contracts Continue

Further Business Placed at Flat Prices of $8 to $8.50 and On Sliding Scales—Government Action Drags

Pittsburgh, Sept. 18.—Fair-sized tonnages of spot furnace coke have been sold this week at from $12.50 to $13, ovens. Buyers continue to come into the market rather freely and some of them evidently are covering requirements for some time ahead in order to secure themselves against a shortage of fuel. Relatively small lots of foundry have been sold at from $13 to $14, ovens. Straight contracts for furnace coke for all of next year on a basis of $8.50, ovens, which have been made, are said to involve good-sized tonnages. Several contracts for furnace coke for 1918 have been closed at $8 to $8.50, ovens. Others on a sliding scale basis of 4½ to 1 and of 5 to 1 on basic iron, valley, are understood to have been made with large consuming interests. For the last quarter some sales were made at $10.50 to $11, ovens. Coke operators and furnacemen both appear to have been equally anxious to make contracts on the straight and sliding scale bases named. The situation at Washington with respect to the fixing of coke prices has brought forth no new developments. The car supply in the Connellsville regions last week was approximately 95 per cent, but this good showing was offset considerably by the unsatisfactory labor situation. Coke production in the Connellsville regions for the week ending Sept. 8 was 355,987 tons, as compared with 336,170 tons for the previous week, according to *The Connellsville Courier*.

Future Offerings Increase

Philadelphia, Sept. 17.—Coke for future shipment has been offered more plentifully in the east during the past week, although the prices quoted do not show much concession from those recently prevailing. Not much interest is being shown by consumers in futures, however. Spot foundry and furnace both have sold at $12.50 to $13, Connellsville.

Spot Coke Still Held High

Cincinnati, Sept. 17.—Although the coke situation two weeks ago gave signs of settling reports this week show that spot coke still is held at very high prices. Other trustworthy reports are to the effect that Pocahontas and Wise county producers have little coke to offer for shipment this year. The New River supply also is curtailed. In the Connellsville field furnace coke is held around $11.50 to $13.50 for spot shipment with contract figures ranging from $9.50 to $10.50. Foundry coke is around $14.50 to $15 for prompt shipment and from $10.50 to $12.50 for the first half of next year. Cooler weather conditions have not increased the output as was anticipated. Pocahontas and Wise county prices are on the same level with Connellsville figures quoted above, but New River producers are asking about 50 cents a ton more for what coke they can sell.

Actual Sales Are Light

St. Louis, Sept. 18.—Leading dealers in coke here report virtually no new business, but the market holds firm, with a fair volume of inquiries. The range on 72-hour Connellsville and Virginia foundry coke continues between $13 and $15, but some dealers report more offering at the minimum of the spread than during the preceding week. Consumption in the St. Louis district proper, and in the territory now being supplied through this market, shows no signs of slowing down, and so far as could be learned not a single user has requested holding up on contract deliveries. Save where labor trouble has necessitated temporary curtailment, the important melters are operating at capacity. Some few contracts have been closed, aggregating around 1500 tons for delivery first half of 1918 at from $12 to $13, ovens. Until the government's program is known, however, future commitments are likely to be held at a minimum. St. Louis dealers departing today for the conference on coal at Washington with Dr. H. A. Garfield, were of the opinion that something definite in the way of an announcement would be forthcoming in the near future.

First Half Foundry at $10

New York, Sept. 18.—Several thousand tons of high grade foundry coke have been sold for delivery over first half in this district at $10, Connellsville.

Production Better in South

Birmingham, Ala., Sept. 18.—Coke production shows continued improvement in the south and there is some hope that within a short while a few of the delayed orders can be caught up with. The coke producers are not in a position to sell any coke, except an occasional car. The statement is made by sellers that the coke production for the remainder of the year has been well sold ahead and that for the first three months of the coming year the probable make will allow but a small additional proportion to be disposed of. The Woodward Iron Co. now is heating up the 60 additional Wilputte by-product coke ovens at its Woodward furnace plant and within another two or three weeks should be getting production therefrom. Quotations now are around $12.50 per ton for foundry coke, with small lots now and then bringing $15. Furnace coke is selling from $8 to $10. Current contract deliveries are around $6. A few of the oldest contracts running down to $4 will expire by the end of this year. Labor agitation in the coal mining district of Alabama is at rest for the time being.

Frank D. Chase, industrial engineer, 431 Peoples Gas building, Chicago, has opened an office in the Whitehall building, Battery place New York, to make possible closer attention to increasing eastern work in his hands.

Ferro Makers Push Sales

Spot Metal Now Offered at $375, Delivered—Tonnage of Spiegel Sold at Lower Prices—Ferrosilicon Easier

New York, Sept. 17.—Eagerness to sell again is evident among domestic makers of ferromanganese with the result that 80 per cent metal now can be had at $375, delivered, for immediate shipment. At least two sellers will do this figure. With regard to last quarter the market has not yet been tested. For first quarter delivery a moderate tonnage was sold a few days ago at $350, delivered. Current demand is of limited proportions and involves chiefly small lots of spot.

A Cleveland consumer who recently inquired for 4000 tons of spiegeleisen for this year has closed for at least a portion of this tonnage. It is understood that between $75 and $80, delivered, was paid for 18 to 22 per cent metal. On next year the market is untested. Demand is light.

An easier tone characterizes 50 per cent ferrosilicon. Several carloads for prompt shipment have been sold around $200, delivered. There is not enough demand to establish any narrow price limits. For next year the situation is indefinite. Although a round tonnage for first half recently was closed at $165, delivered, this now is high and $150 could be done with ease and probably as low as $140. Bessemer ferrosilicon, 11 per cent, is quoted at $95 to $100, Ohio producing points, at which figures some carload business has been done in the east.

Chicago Ferro Firm

Chicago, Sept. 18.—The local stack producing ferromanganese is unable to furnish any material for prompt delivery and no quotation is being made. Eastern ferro is quoted here at $400, furnace. The local maker is quoting $375 for last quarter delivery and $350, furnace, for 1917 delivery.

Market is Dull

Pittsburgh, Sept. 18. — Dullness which has been characterizing the market for ferroalloys promises not to disappear until after the government has announced its price-fixing program. Extremely limited lots of 80 per cent ferromangenese for prompt shipment have been sold in this district at $400, furnace. Inquiries for first quarter are almost negligible. While furnace interests are well booked with contracts, some of them are actively seeking new business. The market remains unchanged as a general thing, although 20 per cent spiegeleisen for last quarter delivery has softened. One small lot of 50 per cent ferrosilicon for prompt shipment is understood to have been sold in this district at a figure well over the prevailing quotation for that delivery, which is $225.

The Muskegon Engine Co., Muskegon, Mich., through Harry D. Hansen, assistant secretary and treasurer, advises that contracts have been let for a $25,000 assembly plant to be built on the 4-acre site acquired some time ago.

Hold Back Bar Contracts

Mills Still Unwilling to Take Requirement Tonnages—Prices Less Firm—Big Rivet Buying for Navy

Cleveland, Sept. 18.—Inquiries for contract lots of steel bars for 1918 delivery from implement manufacturers and other consumers in this district continue before makers, but the latter hold to their position of being unwilling to quote. With one notable exception, and that a manufacturer of moderate-priced cars, builders of pleasure automobiles are specifying for reduced quantities of steel and are operating on a curtailed basis. Bar prices are uncertain in the absence of sales. On reinforcing bars, 4c, mill, openly is named, but it is reported lower can be done on an attractive tonnage. The 2100 tons for a viaduct at Akron are slated to be settled next week. Manufacturers of enameled ware using hoop stock are finding it difficult to manufacture and market their product profitably at present prices for steel and are curtailing accordingly.

Specifications Are Heavy

Pittsburgh, Sept. 18.—While government orders continue to dominate the market for soft steel bars, heavy specifications against contracts are still being made by consumers. New business is extremely limited, but some small lots are understood to have been taken by independent mills on a basis of 4.25c to 4.50c, Pittsburgh, for nearby delivery. Limited tonnages of reinforcing bars are being sold at from 3.50c to 4c, Pittsburgh, for prompt shipment.

Bar Market Firm

Chicago, Sept. 18.—Apparently the market for soft steel bars is firm at 4.69c, Chicago, for first half, but buyers evidently regard this as too high and are not pressing their inquiry for that delivery. Agricultural implement makers, who are in need of definite commitments for next year, have not entered the market actively and appear to be waiting developments of possible government price fixing. One independent interest in Chicago has booked some soft steel bars for export shipment in two or three months at 5c, Chicago. Hard steel bars are not being inquired for in large tonnage and recently about 1500 tons for concrete reinforcement were held up after quotations had been made and no contract has been closed. Hard bars are quoted at 4.25c to 4.50c, Chicago mill. Bar iron is quiet at 4.50c, Chicago, with most mills sold for the remainder of 1917. No selling is being done for next year's delivery. The heaviest demand is for government wagon building and up to this time most material for this purpose has been taken out on existing regular contracts. It is believed additional tonnage will be asked shortly of mills to complete army requirements.

Softer Market Shown

New York, Sept. 18.—Steel bar prices in this district show a softening tendency. A price of 4.50c is the highest that need be paid for moderate tonnages for prompt shipment. From 4c to 4.50c indicates the market over the remainder of the year and 44c easily can be done on fourth quarter.

Orders Placed at 4.50c

Philadelphia, Sept. 17.—Numerous lots of steel bars have been placed by sellers in this district during the past week at 4.50c, Pittsburgh. This seems to be the uniform price for delivery during the next 60 days. For the last quarter, quotations range from 4c to 4.50c, Pittsburgh. Bar contracts are being specified very freely. An export inquiry for 200 tons of forging bars is current.

Navy Closing Nuts and Rivets

Pittsburgh, Sept. 18.—Difficulty in getting raw materials has resulted in a slight falling off of new domestic business taken by makers of nuts, bolts and rivets in this district. Producers have found themselves able to supply

considerable capacity for private buyers, despite heavy government orders. It is probable that contracts will be divided among four or five of the leading producers for 35,000 tons of rivets and 20,000,000 bolts, involving about 2000 different sizes, being asked for by the navy department. Builders of ships for commercial business are also placing orders freely for bolts and rivets and requirements will be further increased when the Emergency Fleet Corp. comes more actively into the market.

Hoops and Bands Quiet

Pittsburgh, Sept. 18.—Aside from the small tonnages of hoops and bands sold for prompt shipment at 5c to 6c, mill, for hoops, and 5.25c to 6c, mill, for bands, the market for these products is extremely dull. Inquiries of importance are lacking and an active buying movement is not expected to develop for some time.

Shafting Orders Not Heavy

Pittsburgh, Sept. 18.—New buying of shafting for private consumption is quiet and specifications against contracts are also limited. The government continues to be the chief factor in the market and in addition to the heavy contracts already placed, is about to come into the market for additional heavy requirements. Small tonnages for private use have been sold in this district for prompt and last quarter delivery at 10 and 5 per cent off the list.

Plate Mills Handicapped

Coal Shortages Cut Eastern Operations to 60 to 75 Per Cent—Government Specifications Heavier Than Ever—Some Firmer Prices

Philadelphia, Sept. 17. — Eastern Pennsylvania plate mills now are operating under unusual difficulties, which prevent them from turning out more than 60 to 75 per cent of the tonnage they otherwise would be capable of producing. The principal difficulty is that of obtaining coal, their receipts of this important raw material enabling them to operate only on a hand-to-mouth basis and to pile up no emergency surplus whatever. One mill has four relined furnaces ready to light but cannot start them because of the shortage of gas coal. Specifications of government steel are coming in much more heavily than the mills can take care of them, especially from the Emergency Fleet Corp., and the indications are that deliveries of steel for the regular uses will have to be postponed indefinitely. Inquiries for export plates are coming in steadily. Today one mill turned down an export inquiry for 13,000 tons of hull steel and 2000 tons of boiler steel wanted for export in 1918. Some of the mills are not quoting less than 10c, Pittsburgh, for tank steel for shipment at their convenience. Where as low as 8c, Pittsburgh, recently was quoted by some makers, 10c was named this week.

Among sales of the week were 1000 tons for export at 9c, Pittsburgh; 1000 tons to a domestic buyer at 9c, Pittsburgh; and about 3000 tons of Lloyd ship steel for export, at 10c, Pittsburgh.

Japan Gets Licenses

New York, Sept. 18.—Chief among the developments in plates is the fact that permits now are being issued on material for war purposes to be shipped to Japan and other countries, but principally to the former. Considerable tonnage was involved in the licenses of this character issued during the past week. Big export inquiries now before the trade include one put out by the American International Steel Corp. for 25,000 tons of plates and shapes for Italy. The plate market is distinctly easier. Middle western makers freely are quoting good-sized tonnages of tank plates for nearby shipment at 7.50c to 8c, Pittsburgh. This range indicates the current market range.

A lot of 12,000 tons of tank plates for France is under negotiation and is expected to be closed without delay. Semifinished steel has been quiet during the week. France purchased about 11000 tons of No. 5 wire rods at concessions from prices recently paid. Italy wants 5500 tons 5 x 5-inch bessemer billets. The Italian government has not yet closed for 60,000 tons wire rods, slabs and billets for which it recently inquired.

Last Quarter Next Year Quoted

Pittsburgh, Sept. 18.—Considerable interest has been aroused in the plate market by the fact that the Carnegie Steel Co. has quoted on 3500 tons of plates for delivery during the last quarter of 1918. It is understood the figure named was around 4.50c, Pittsburgh, and that this company which has been refusing all private business is sounding out the market. Contracts involving large tonnages of plates have been placed by the government for buildings to be constructed in France. The orders placed are understood to exceed considerably the quantities which had been announced. One large contract for fabricating steel buildings in France placed with the Blaw-Knox Co., Pittsburgh, it is understood, will call for night and day operations for two months. The government has not done anything with regard to its recent inquiry for 10,000 additional steel cars for shipment to France. This order is being held up until ship space can be provided. The government has also asked for deferred delivery of the 8000 cars which it ordered several weeks ago, the shipments to be spread over until May 1 of next year.

Navy Buys at 8.25c

Youngstown, O., Sept. 18.—Additional purchases of plates in 100-ton allotments have been made by the naval department at 8.25c, mill, for tank steel. A sale of 700 tons of plates at 8.50c, mill, to a domestic buyer is reported. The government has placed a number of orders for steel pipe of from ½ to 10 inch sizes for a base hospital.

8c Price Less General

Cleveland, Sept. 18.—A price of 8c, Pittsburgh, on tank plates, which recently have been available in various directions, is not as freely quoted as a week or so ago. Some eastern mills which were entertaining business on this basis recently, now have moved their prices back and this week named 9c and 10c, mill. The higher price was the last quoted. Some makers, however, seem to be more desirous of tonnage to round out their books and the 8c, Pittsburgh, price has not disappeared. Local mills openly are quoting 8.50c, Pittsburgh.

May Resume Exports

Chicago, Sept. 18.—Advices today from Washington to the effect that Japan may use her ships on the Atlantic and thus obtain revocation of the embargo against ship plates being exported to that country have aroused much interest among plate makers. Since the embargo was laid contracts for export to Japan have been held in abeyance and this has given opportunity for mills to make better deliveries on domestic material. If the embargo is removed export shipments will be resumed and domestic users will find the situation much tighter than at present. An independent plate maker is quoting 8.19c to 9.19c, Chicago, for 30-day shipment. Demand for other than shipbuilding has not been strong recently.

Sheet Tonnage Alloted

Government Places 11,000 Tons for Camps in France at 6.50c, Other Inquiries Pending—Prices Easier

Youngstown, O., Sept. 18.—For the camp requirements of General Pershing's forces in France, 11,000 tons of No. 28 black sheets have been allotted among different makers, including several in the Mahoning valley. The price at which this business is being placed is 6.50c, mill. Present sheet inquiry from the government and domestic sources before makers in this district is very heavy. Mill prices are quoted unchanged, but the market shows a trend toward greater easiness.

More Tonnage for Government

Philadelphia, Sept. 17.—Further tonnages of government sheet business, both direct and indirect, were placed in the eastern market during the past week. A considerable number of new private orders also were closed at 8.50c for No. 10 blue annealed. This same figure is being quoted on No. 28 black and 10.50c is being named on No. 28 galvanized. An inquiry from South America calls for 1000 tons of black sheets.

Offer Black at Concessions

Cleveland, Sept. 18.—Some further price concessions on offerings of sheets have appeared in this territory during the past week. A lot of 1000 tons of No. 28 black was offered at 7.75c, Pittsburgh, and part or all of it was taken on by local consumers. Usually mill prices have been considerably higher than this figure and 8.50c, Pittsburgh, has been considered the minimum for both No. 10 blue annealed and No. 28 black.

Sheet Export Demand Good

Chicago, Sept. 18.—Makers of steel sheets find excellent demand for all grades, mostly for export. Quotations are firm, with No. 28 gage black quoted at 8.94c to 9.19c, Chicago, No. 10 gage blue annealed at 8.69c to 8.94c, Chicago, and No. 28 gage galvanized at 10.19c to 10.69c, Chicago. The leading independent will resume operations shortly with about half its galvanizing capacity and is contracting for November delivery and later.

Government Closes Tonnage

Pittsburgh, Sept. 18.—A heavy demand exists for sheets of all kinds. The government again is buying and is understood to have closed one contract during the past week for 8000 tons of No. 28 gage galvanized sheets. It is freely predicted that practically all private buyers will find themselves short of supplies of sheets before the end of the year. Buyers from all sections of the country are specifying freely against contracts made in April for last half shipment. In view of heavy demands made by the government it looks as though producers are going to be unable to meet the full requirements of private consumers. Some of the latter who are engaged in government work have taken sheets which they had bought for private use and have diverted them to the government's needs. This seems to be particularly true of makers of electrical equipment, who have used their stocks of electrical sheets to turn out government orders quickly.

Sheet Bar Tonnage Closed

Valley Producer Sells 60,000 Tons at $90—Government Allots 40,000 Tons of Shell Steel at 4.50c, Mill

Youngstown, Sept. 18.—A sale of 60,000 tons of open-hearth sheet bars has been closed on the basis of $90, mill, by producers in valley territory. These bars are to be delivered at the rate of 5000 tons a month. A sale of 400 tons of open-hearth sheet bars for domestic delivery also is reported at $85, mill. The sales of the leading sheet barmaker in this territory for the fourth quarter have averaged $90, mill. Last week the government put out an inquiry for 40,000 tons of shell steel at an indicated price of 4.50c, but none of the mills was inclined to accept this business. This week a demand was made upon the makers for this tonnage and the mills now have accepted their allotments. The valley district is expected to share freely in the distribution of 1,500,000 tons of shell steel, which, it is estimated, the government will require when the necessary appropriations for munition purchases have been passed.

Market Holds in East

Philadelphia, Sept. 17.—Despite the weakness in the semifinished market reported in various western districts, prices in this territory are being well maintained. A sale of 1000 tons of soft rerolling billets at $100, mill, to a domestic consumer is reported. Approximately 10,000 tons of high carbon shell discards have been sold in eastern Pennsylvania around $60, Pittsburgh.

Billets Somewhat Easier

Pittsburgh, Sept. 18.—Softening of the market for billets is indicated by small sales made during the past week. Despite the fact, however, that some transactions are reported to have been closed at figures under $70, that price appears to still represent the market. The report that the Italian government had closed a contract for a large tonnage of 4 x 4 bessemer billets on a basis of $60, mill, lacks verification. The market for sheet bars is extremely quiet and both bessemer and open hearth are quoted at $80.

Price Easiness Prevails

Cleveland, Sept. 18.—A northern Ohio consumer who has been figuring on 500 to 1000 tons monthly of high grade steel for the first half of next year still refrains from closing. Various reports of easy conditions in the semifinished market continue to appear. Some buyers report they are able to obtain soft steel billets under $80, Pittsburgh. Forging billets are reported to be available at $100, Pittsburgh. The sheet bar market still is unsettled, as far as the local situation is concerned. No sales have been made and consumers appear in no hurry to act, although it is believed the placing of some last quarter tonnage cannot be far away. Some of the makers continue to talk of $90, Pittsburgh, for open-hearth bars.

Government Wants Strip

Pittsburgh, Sept. 18.—In addition to the heavy contracts which it has already placed with mills for tonnages of cold-rolled strip steel, it is reported that the government is about to come into the market for still greater requirements. Producers are being urged by the government to deliver material as rapidly as possible. Private buying continues to be dull and prices are unchanged.

Officers of the Parker Mfg. Co., Detroit, drill chucks and arbors, which was incorporated in July with $75,000 capital, are: President and treasurer, Gorham C. Parker; vice president, David C. Rice; secretary, Howard K. Chambers; directors include the officers already mentioned and Charles D. Bennett and Kenneth P. Albridge.

Structural Still Slumping

July Lettings Only 38 Per Cent or Smallest in Number of Years—Philadelphia Subway Contracts Closed

New York, Sept. 17.—During August, 38 per cent of the entire capacity of the bridge and structural shops of the country was contracted for, which with the exception of the 35 per cent in October, 1914, is the smallest ever reported. August's showing is equivalent to 68,400 tons and compares with 41½ per cent or 74,700 tons in July. Following is the table showing comparison of figures as compiled by the Bridge Builders and Structural Society:

Month	Per cent	Approx. tonnage
August, 1917	38	68,400
July	41½	74,400
June	47½	85,500
May	56½	102,000
April	61	110,000
March	68	122,000
February	59	106,000
January	61½	119,000
December, 1916	86	148,000
November	78	134,000
October	77	133,500
September	52½	99,400
August	64	112,600
July	47½	83,600
June	58	100,000
May	80	137,000

Shape demand from abroad greatly is improved. New inquiries from Japan, England, Argentine and other countries average 3000 to 4000 tons daily. Lack of assurance as to the granting of licenses, prevents makers from quoting on these. Prices on plain shapes are easier and 4.50c, Pittsburgh, readily can be done on good sized tonnages for this year and 4.25c has been quoted. For early next year material is offered freely at 4.25c, Pittsburgh.

Subway Sections Awarded

Philadelphia, Sept. 17.—After numerous uncertainties, contracts for the construction of sections Nos. 103, 201, 203 and 204 of the Philadelphia subway system definitely were let during the past week to the Keystone State Construction Co. The steel for these sections, about 15,000 tons, although not yet formally awarded, is to go to the McClintic-Marshall Co. Contracts for the construction of two other sections, involving about 7000 tons, have not been let. There is some doubt whether the low bidders, the Philadelphia Subway Construction Co., and Smith, Hauser & McIsaacs, will agree to undertake the work since their bids were submitted several months ago, and market conditions have changed considerably in that time. The principal new project now up involves 2000 tons for the new plant of the Tacony Ordnance Corp. Bids will be opened Sept. 28 on a round tonnage for a pier at Penn Treaty park, Philadelphia. Additional contracts for troop supply warehouses in France have been let by the Stone & Webster Engineering Corp. Each of these buildings, numbering 100, will require about 100 tons. No contracts in connection with the 37 ammunition buildings for France yet have been let. Plain shapes are going at varying prices. On 1000 tons for shipment in 60 days a mill quoted 4.50c, Pittsburgh. Another mill booked several lots, including one of 1200 tons, at 5c, Pittsburgh, for delivery late this year or early next. One lot of 1600 tons of ship shapes for export has been sold at 5.50c, Pittsburgh. There is no demand from domestic shipyards at present as all these interests are looking to the government for their steel. The Midvale Steel & Ordnance Co. will furnish 1600 tons in connection with the United States government railway in France. A lot of 5000 tons of ship shapes has been closed to the far east.

Fabricators Booked Far Ahead

Pittsburgh, Sept. 18.—Fabricators in this district are booked far ahead with both government and private contracts and are not actively in the market for new business. Some of them have tonnages on their books which will require 10 months to fill, while those with the smallest booking have requirements which will call for at least two months' operations. Government work continues to dominate the market and will become heavier as plans are made for the construction of steel ship yards and other plants to be built for it. Prices remain unchanged.

Ask Crane Steel For France

Cleveland, Sept. 18.—Inquiries are current from the manufacturers for about 1800 tons of shapes, plates and bars, covering 45 to 50 traveling and gantry cranes which are to be ordered by the government for handling and conveying work behind the lines in France. For the Baltimore & Ohio freight depot in this city, from 3500 to 4000 tons of reinforcing bars and shapes will be required. Offers of resale tonnages of standard lengths of shapes from stock by fabricating shops continue to come out. One new lot of this kind involves 2000 tons.

Takes Army Buildings

Buffalo, Sept. 18.—Of a 12,000-ton order for structural steel for the construction of warehouses in France for the United States government, the Lackawanna Bridge Co. received 1500 tons. The rest of it is said to have been apportioned between five and ten different shops. Of 450 tons of roofing sheets in connection with the same project a Buffalo producer received one-half the order.

Western Fabricators Not Busy

Chicago, Sept. 18.—Structural fabricators find their bookings much reduced and probably none in the Chicago district is operating now at over 50 per cent of capacity. At Milwaukee, from local industrial activity, shops are busy but all their bookings are for rush jobs and no distant contracts are being made. Shape prices are quoted unchanged.

CONTRACTS PLACED

Structural steel frames for four box car unloading machines for the Pennsylvania Railroad Co., Northern Central elevator at Baltimore, Md., 270 tons, to Morava Construction Co.

General contract for subway sections, Philadelphia, requiring 15,000 tons of steel, formally placed with the Keystone State Construction Co.; McClintic-Marshall Co. to furnish steel. Additional sections involving 7000 tons steel to be placed.

CONTRACTS PENDING

Freight depot for Baltimore & Ohio railroad, Cleveland, 2000 tons of shapes and 1500 to 2000 tons of reinforcing bars; George A. Fuller Co. has general contract.

Buildings for Tacony Ordnance Co., Tacony, Pa., 2000 tons; bids being taken.

Pier for Penn Treaty park, Philadelphia; tonnage not estimated; bids being taken.

Model storage building for Washington navy yard, 250 tons bids being taken.

Foundry for Penn Seaboard Steel Corp., Chester, Pa., 400 tons, bids being taken.

Power house at Plainfield, N. J., for Niles-Bement-Pond Co., 200 tons, bids being taken.

Tin Plate Prices

For Government Still Awaited—Delay Opening 1918 Books

Pittsburgh, Sept. 18.—Except for purchases made by the government, the tin plate market continues to be dull. Small sales from stocks are being made to private consumers, but mills are so well filled up with orders that they are not in a position to offer large tonnages. It is not believed the market will change from its present position until after Oct. 1, if then. It is probable that manufacturers will be compelled to delay the opening of their books for 1918 requirements.

Eastern Scrap is Livelier

Some Grades Advanced Under Heavier Demand—Mixed Conditions in Other Districts and Prices Go Lower

COMPLETE SCRAP PRICES ON PAGE 628

Philadelphia, Sept. 17.—Demand for old material has broadened out somewhat in this district during the past week. While no large tonnages figured, small transactions have been more numerous. This improvement characterizes practically all except the foundry grades. The embargo on the Pennsylvania railroad continues to make it difficult for dealers to make deliveries. While special permits are being granted right along for shipments to the less congested points, the process of securing these is by no means simple, so that shipments are at only about 50 per cent of the rate called for in contracts. Present prices continue to induce numerous rejections from consumers. Price changes include an advance of $2.50 in No. 1 heavy cast scrap and one of $2 in rerolling rails. Price declines are $1 on No. 1 heavy melting steel, wrought pipe and frog, switch and guard rails; $1.50 on No. 1 forge and bundled sheets and $0.50 on cast borings.

Sales Slightly Heavier

New York, Sept. 17.—Scrap has been sold in a better volume during the past week in this district, although the improvement is so slight as to prove barely perceptible. Current demand in no case involves any large transactions and business is made up entirely of carloads which are wanted for immediate consumption. The dealers continue to find it easy to get scrap to take care of their commitments. Prices on old car wheels, steel axles and steel shafting have softened noticeably, due to the continued lack of demand for these descriptions. Machine shop turnings also have declined slightly during the week. The Delaware, Lackawanna & Western railroad is expected to put out a small list next week. All the railroad lists which have come out recently have been fairly small.

Embargoes Delay Shipments

Pittsburgh, Sept. 18.—Much delay is being occasioned in the shipment of scrap from this district by railroad embargoes. On the Pennsylvania lines a special permit is required to move each car either originating on those lines or consigned to them from foreign roads. On the New York Central lines also a special permit is required to load and unload each car. The position of the scrap dealer also is complicated by reason of the fact that there are a number of embargoes at the plants of large consumers. As a general thing, however, supplies of consumers are reported to be low and it is believed they will be forced to come into the market in the near future and to buy freely. Heavy melting steel is quoted at from $36 to $38 and small tonnages have been moving at these levels. Low phosphorus scrap is quoted at $49 to $48, but dealers are not trying to force the market. There is some inquiry for billet and bloom ends, of which a scarcity is noted.

Prices Believed Low

Buffalo, Sept. 18.—The scrap market shows more activity than last week but the price schedule remains purely nominal. The downward trend of last week appears to have been checked for the time being. Dealers ascribe the bolstering up of the market to the purchase of a large tonnage in the Pittsburgh district. The impression exists that the prevailing schedule of prices would be found to be low under an actual test, as any attempt to buy in sizeable tonnages quickly would boost quotations. Dealers are not showing any anxiety to sell except such scrap as must be moved without delay. There is a disposition on the part of dealers to make price concessions on shipments to points which are comparatively easy of access.

Demand is Improving

Cleveland, Sept. 18.—With inquiries for tonnages running into four figures coming in, and demand improving, especially for cast borings, machine shop turnings and heavy melting steel, scrap dealers in this district report the scrap market apparently as beginning to move. Nothing like heavy sustained buying is expected, however, much before early October. Dealers are beginning to trade more actively among themselves to cover short sales and to clear their desks for better buying. Slightly higher quotations are shown in several lines. Short steel rails and long steel rails for melting are $1 higher and are quoted at $35 to $36 and $32 to $33 a gross ton, respectively. In the net tonnage division stove plate, No. 1 busheling and No. 1 machine cast are $1 higher. Cast borings and grate bars have been raised 50 cents. Heavy melting steel is firm at $33 to $34 a gross ton, and machine shop turnings at $18 to $18.50 a net ton. Transportation conditions are about as satisfactory as possible under the general circumstances covering all kinds of industrial shipments.

Chicago Market Quiet

Chicago, Sept. 18.—Developments in the market for iron and steel scrap are few and conditions remain almost stationary. The general trend of quotations is slightly downward but the change is slight. Since the recent buying by a steelmaker, little movement has taken place and most consumers prefer to wait developments in the hope that government regulation may have the effect of reducing prices. The Santa Fe offers a list presenting 1950 tons and the George W. Jennings Co. offers 340 tons.

Buying is at a Minimum

St. Louis, Sept. 18.—The scrap iron and steel market here during the past week has been inert. Barring the sale of a rather fair tonnage of heavy melting steel and car wheels, very little material has changed hands. Changes in quotations have been insignificant, and represent more adjustment than any variation in supply and demand conditions. Dealers are not anxious to dispose of extensive tonnages in view of market uncertainties and transportation facilities. For these and other reasons buyers are loath to make commitments. There has been some trading among brokers to cover short sales and to dispose of scrap on track in order to avoid demurrage charges. Indications beneath the surface all point to a return of activities in the near future. Consumption has not decreased and important melters continue to eat into their stocks, with the result reserves are being steadily depleted. Available supplies in dealers' hands are not large. Carriers are not gathering nor moving much scrap.

Prices Again Droop

Birmingham, Ala., Sept. 18.—Another drooping spell has come over iron and steel scrap in the south. Not only a slight accumulation of old material again is noticeable, but quotations are off somewhat. Consumers of heavy melting steel are not as anxious to buy as they were recently and are willing only to take on some of this stock at concessions. The iron and steel market is strong, considering the way the present abnormal conditions are holding back new trading, and for that reason it is hardly believed that the weakness in old material is going to continue very long.

Don't Take Heart Out of Business

President George M. Reynolds of United States Chamber of Commerce Addressing Great Patriotic Convention Calls for Proper Consideration and Encouragement of Business as Big Factor in Winning of War

ATLANTIC CITY, Sept. 18.—Patriotism is the impelling force behind the great mobilization of the nation's industry and commerce effected by the Chamber of Commerce of the United States to give answer emphatically and exclusively in a four-day war convention to the question "what can business do to help win the war?" When the opening session was called to order this morning, nearly 2000 delegates from every section of the country had registered and the pier where the meetings are being held was crowded to capacity.

George M. Reynolds, president of the Continental and Commercial National bank of Chicago, in terms that cannot be mistaken in the legislative halls at Washington cautioned against the government's policy of price fixing, made a plea for lower excess profit tax and pointed to the result of pooling by the railroads and the results that may be attained by the co-operation of the government and business. The address delivered by Mr. Reynolds gave frank expression to the sentiment of the manufacturers and business men of the United States on the big questions now up for solution at the seat of our government. That his views received unqualified endorsement was reflected by the thunderous applause that frequently interrupted his 60-minute talk.

Cautions Against Price Fixing

On the subject of price control he spoke as follows: "Failure to give due consideration to all angles of price fixation will work untold mischief. We are on a high price plane. Stocks have accumulated upon this basis. If we compel the maker of hardware to mark down his goods to war figures, in fairness he will reply that such action will force him into bankruptcy unless he can reduce wages and all other items of cost. We have every reason to believe the latter to be impossible of immediate accomplishment. Unless there is to be disorganization and demoralization we must recede from the present level gradually. Any other way would be unsound and would produce chaos where order is necessary.

If prices were forced materially lower at one stroke two things would happen. The percentage of earnings subject to the excess profits tax would decline, and there would be a shrinkage in the volume on which earnings would accrue, so that there would be a cumulative lessening of the sum the government expects to receive from this source. To my mind this argument is absolutely irrefutable. of taxes.

"Closely related to price reduction is the excess profit tax. There has been so much discussion of the scheme of taxation which we are inaugurating, and so much delay in definitely fixing the rate as to hold a very considerable volume of business in abeyance.

"Admitting that there is reasonable ground for a big tax which will absorb some of the excess profits, and prevent overexpansion, at the same time we are experimenting, and if we overstep and take the heart out of business we shall defeat the end in view. There is grave danger here. We are not fighting for ourselves and our allies alone, but for future genertaions, and in all fairness the burden of financing the war should be divided. Those who come after us and will enjoy the freedom secured through our contributions of men, materials and money cannot object if we transmit to them the privilege of sharing in the cost. If repayment of the extraordinary amounts raised to carry on the struggle be spread out over a term of 25 years or even 50 years, no injustice will have been done those who may be required to retire the last of the bonds."

Mr. Reynolds advocated the payment of taxes quarterly in place of annually, to reduce the disturbance in the financial world to the minimum.

On the subject of pending national legislation and the attitude of the government toward business—particularly big business, Mr. Reynolds did not mince words. "There never was a time in our history," he said, "when the government so urgently needed the help that it will receive from an undiminished effort to reach maximum production in all industries, yet even now there are unmistakable signs of hesitancy. Business men are afraid to place orders because they do not know with sufficient certainty what the policy of the government upon many subjects vital to the safe conduct of business will be or when these policies will be announced.

"Therefore, with all the earnestness of loyal citizens let us importune congress and the administration to settle this matter of doubt speedily and with the facts, clearly in mind, and with business receiving that encouragement that will enable it to go ahead with determination and confidence.

No Time for Partisanship

This is no time for partisan policies. Party differences should be confined to fundamental principles and should not be permitted to descend to the petty quarrels of obstructionists.

"We are facing forward and should now and forever wipe out all these damaging notions about business needing a particularly strong brand of legislation and regulation simply because it is big. The size of the establishment alone should not subject it to condemnation. What would we do today without the tremendous aggregation of capital engaged in transportation mining steel making and lumbering? We should be at the mercy of the enemy for stripped out of these concerns of great size, it would be utterly impossible to get deliveries of copper, iron, steel and lumber in sufficient quantities. We must have big business and the bigger the better in this war crisis."

Crystalization of sentiment in favor of the creation of a war board similar to the ministry of munition in England, and the government establishment of the price of labor at the same time the price is fixed upon the commodity into which such labor enters, was reflected by the discussion at the afternoon sessions. Waddell Catchings, chairman of the chamber committee on co-operation with the council of national defense, discussing the work of the war industries board, said that there is a question whether this board can go beyond the purpose for which it was intended and meet the industrial problems arising from the government purchase. "Chaos exists in business today," he concluded, "and order must be brought out of chaos if we are to win this war."

Among the speakers today were Secretary of War Baker, Secretary of the Interior Lane, Dr. Newell Dwight Hillis, of Brooklyn, Charles Edward Russell of the American Mission to Russia, and Hon. Boris Bakhmettff, Russian ambassador to the United States. Hon. Frank A. Scott, chairman of the war industries board, was prevented by illness from filling his place on the program.

Issues Export License List

Many Iron and Steel and Related Products Put Under Ban Dating From Sept. 20 by Government Announcement

Washington, Sept. 18.—Demand of the United States government for pig iron, semifinished steel, steel plates, ferroalloys and scrap iron and steel has practically placed these articles under an absolute embargo so far as exports are concerned. Application for license to ship these commodities beyond the borders of United States must be made on form A-3 which requires a declaration of the shipper that they are intended for actual war purposes. Tightening of the embargo on these exports is for the conservation for use by the American government, according to a statement of the exports administrative board. This new restriction affects all shipments under bills of lading dated on or after Sept. 20.

Materials Requiring License

The list of articles requiring individual license under form A-3 as published by the board is as follows: "Pig iron, ferromanganese, ferrosilicon, spiegeleisen; steel ingots, billets, blooms, slabs and sheet bars; iron and steel plates, including ship, boiler, tank and all other iron and steel plates ⅛-inch thick and heavier and wider than 6 inches whether plain or fabricated; scrap iron and scrap steel." Most of these articles have required special license for shipment to Canada and Newfoundland and, of course, continue under the new embargo. The articles in which there is a shortage and which also require special license, in addition to those mentioned, are: Acetone, alcohol, aluminum, ammonia salts and nitrate, anhydrous ammonia, arsenate of lead, arsenate of soda, boiler tubes, butter, phenol, castor oil and castor beans, chrome-nickel steel, cotton linters, cyanide of sodium, ferrovanadium, flax, glycerine, mercury salts, nitrate of soda, nitric acid, nitric salts, phosphoric acid, phosphorus, potash and chlorate of potash, potassium salts, search lights and generators, sodium sulphide, sugar, sulphate of ammonia, sulphur and sulphuric acid, superphosphate, tin plate, toluol, tungsten, wireless apparatus, wheat, wheat flour and wool rags.

The license board says: "Export licenses may be granted, however, for the above articles when destined for actual war purposes or when they will directly contribute thereto; and in certain unusual cases when such exports will contribute directly to the immediate production of important commodities required by the United States, and also in certain other cases where the articles may be exported in limited quantities without detriment to this country.

Shipments to European Neutrals

When all other articles are to be shipped to European neutrals, license application must be made on form A-1; when to be shipped to other countries of the world, exclusive of Germany and her allies and their territories, application must be made on form A-2.

The following list of iron and steel and associated articles has been culled from a list issued by the board, showing what articles require license:

Aeronautical machines and instruments; aluminum and aluminum articles; anti-aircraft instruments; antifriction metal; arms; babbitt metal; all sizes of structural iron and steel beams and angles; blooms, water plugs, plates, fittings and tubes of iron, steel and copper; steam boilers, bolt-heading machines, boring tubes, structural channels, coal and coke, silver and gold coin, copper and copper articles including bars, ingots, plates, rods, scrap, sheets, tubes, wire and copper sulphate; corrugated copper gaskets, crucibles, industrial diamonds, drilling implements and machinery, drill presses, electrical equipment, electric generators, engines, exhaust pipes, explosives, ferrochrome, ferrocyanide potash, ferromanganese, ferrosilicon, boiler fire box, fuel oil, gasoline, steam gages, power-driven grinders, high-speed steel, iron plates including ship, boiler, tank and all other iron plates ⅛-inch thick and heavier and wider than 6 inches and circles over 6 inches in diameter; power-driven knife grinding machinery, condenser machinery including metal and wood working; oil well drilling pumps, turbines, machetes, machine tools, optical magnifiers, engines except locomotives, mirror iron, steam, gas and electric motors; nickel, silver, oil well casting implement and machinery; oils, including fuel, lubricating, lantern, naphtha, benzine, red, kerosene, gasoline, rapeseed, cylinder and oleo; pig iron; phosphorized 5 per cent tin; power driven pillar press, power driven planer, platinum, potential transformers, propeller shafts, steam and electric driven pumps, sawmill machinery, scrap iron and steel, steel slabs and sheet bars, solder, specular iron, spelter, spiegel, spiegeleisen, fabricated structural steel, steel hardening materials, superheaters, taps and dies if for machine use; telephone apparatus, tin, tin cans except when used as containers, tin foil, tin plate, all articles containing tin, toluol and its derivatives; steel tools, turbines, turret holders, printing type, wireless apparatus; X-ray apparatus, sodium and sodium compounds, all acids, ammunition, barium nitrate, benzol and its derivatives; tin stitching wire, bronze, binitrophenol, diphenylamine, emery, carborundum and emery and carborundum wheels; and phosphoric acid and the various phosphates.

Fifty Vessels

Closed by Emergency Fleet Board With Submarine Boat Corp.

New York, Sept. 18.—Henry R. Carse, president Submarine Boat Corp., announces the signing of a contract with the emergency Fleet Corp whereby the former will construct for the government fifty 5000-ton standardized steel vessels. Deliveries are to commence next June and to be completed by the end of 1918. The work will be done on a cost and fee basis. The government has option of ordering 150 additional vessels of the same tonnage and size.

President Carse says the work will be under direction of Vice President Supthen and arrangements have been made for the association with the Submarine Corp. of B. L. Worden, formerly president of Lackawanna Bridge Co., George A. Anthony, marine engineer to quartermaster general of the United States army, and Frank E. Kirby, naval architect.

Officials of the American International Corp. announce that the Fleet Corp. has signed contracts authorizing their company to proceed with its proposed yard at Hog Island, Pa., on the Delaware river and for the construction therein of 50 fabricated steel vessels. It is understood the first of 50 ships will be completed within 10 or 11 months and the entire number will be finished probably within 15 or 16 months. The fabricating plan calls for the manufacture of parts of ships and only assembling their parts in the yards.

Seven Billions

Represented by War Deficiency Bill—Shipping Board Gets Big Sum

Washington, Sept. 18.—Expenditures aggregating $7,023,786,130 for war purposes are authorized in the urgent deficiency bill and its amendments now pending in the house, the greatest war fund ever considered at one time. It exceeds by $423,786,130 the "approximately $6,600,000,000" reported in THE IRON TRADE REVIEW last week as under consideration by the house in the original bill carrying $4,810,979,370 and in additional requests being in-

vestigated by the house appropriations committee. The committee has recommended the bill and the amendments carrying the huge sum which is $41,740,405 less than the total asked by the government departments.

In the increase in the measure as originally reported is $1,484,000,000 for the shipping board. The board already has had $405,000,000 of the maximum of $800,000,000 previously set aside for it. The present bill increases the total to $1,889,000,000. The new grant includes $200,000,000 for the "purchasing, requisitioning, or otherwise acquiring plants, material, charters or ships now constructed or in the course of construction" and the expediting of construction of ships; $250,000,000 for the construction of vessels; $150,000,000 for purchase of ships not otherwise authorized; $35,000,000 for the construction of three government shipyards; and $849,000,000 for contract authorizations.

Another important item in the increase is $350,000,000 for the navy's new torpedo boat destroyer program. The amendment to the bill gives $225,000,000 for immediate expenditure and authorizes the remainder in contracts.

These items for the navy and merchant marine make a total outlay of $1,834,000,000. The remainder of the increase over the $4,810,000,000 in the original present bill goes in smaller sums to the army and other departments, of which $132,656,000 is for machine rifles, field artillery, small arms practice ammunition and additions to arsenals and $235,302,750 is in army contract authorizations.

Want Six-Inch Shells

Toronto, Canada, Sept. 17.—The imperial munitions board at Ottawa announces that although the British government has discontinued giving out contracts for the larger sizes of shells, orders for 6-inch shells will still be continued to those plants which are equipped for their manufacture. Plants which have been making 8-inch and 9.2-inch shells in Ontario and Quebec and have had to close down for want of orders, will now in many cases be refitted for the manufacture of 6-inch shells.

Furnace is Blown Out

The Claire furnace, Sharpsville, Pa., owned and operated by E. W. Mudge & Co., Pittsburgh, has been blown out to undergo extensive repairs. The stack will be relined, new engines will be installed and other improvements and repairs made. The work, which will probably require at least 30 days, is being done by the Sharpsville Boiler Works.

Steel Ships Win the Day

Goethals' Plan to Place Main Reliance on Steel Tonnage Vindicated in House—Wooden Construction Virtually Dropped

Washington, Sept. 18.—Steel ships advocated by General Goethals when he was general manager of the Emergency Fleet Corporation will be built under the program of the United States shipping board. Wooden ships will be constructed only under such contracts as actually have been let and may be contemplated where steel is not immediately available. This program vindicates General Goethals, who has been succeeded by Admiral Capps. It further relegates to the background William Denman, who stood in Goethals' way and who since has been succeeded by E. N. Hurley as chairman of the board.

Disclosure of the shipping board's program, as contemplated by Goethals and in practically the same scope by Hurley and Capps, was made to the house committee on appropriations by the new shipbuilding chiefs when they appeared before it for additional funds. This, in turn, was made public when Congressman Stafford of Wisconsin, a member of the committee, spoke in favor of the board's request which was recommended to and accepted by the house as an amendment to the urgent deficiencies bill appropriating approximately $7,000,000,000. Mr. Stafford said:

"The appropriations that are carried in the supplemental amendments offered by the committee provide for a shipping fund that makes, with the prior appropriation of over $500,000,000, a grand total of over $1,700,000,000. The shipping board purposes to utilize to the maximum every shipbuilding yard, both public and private, in the country, and to have them operated at their maximum efficiency for the next 24 months. It not only purposes to utilize the existing yards, but it is contemplated to have the government establish three additional yards, which will be utilized for the assembling of fabricated steel in the construction of completed hulls.

"The hearings before the committee disclose that the program as outlined by the late manager of the Emergency Fleet Corp., the renowned, capable, energetic Lieut. Gen. Goethals, has been almost in every particular approved of and carried out by his present successor. The unfortunate squabble that caused the severance of the relations of this great canal builder and constructive engineer from the government shows, as far as the testimony discloses, that his idea of the necessity of building steel ships, if we were going to have a real merchant marine to carry the increased tonnage and to take the place of the tonnage that is being sunk and will continue to be sunk until the submarine menace is checked, was the proper one.

Wooden Ships Virtually Dropped

"The new board has virtually abandoned the policy of building wooden ships. It may be fair to say that that is partly due to the inability of securing necessary lumber. But any mechanical engineer—and he does not have to be an engineer—but any large manufacturer would know that where you are building ships of a certain model, when you once get the model established it is only a question of manufacturing in large numbers the same forms in fabricated steel in order to turn out the necessary hulls that will result in expedition in the building of a large fleet of ships.

"Another practical reason that appeals to any business man is that when this war is over and the United States government will have this immense fleet that it is building for its use in carrying the merchandise of our country the world over, that if we are going to have a practical merchant marine to cope with the conditions then existing, a steel-ship fleet of large tonnage such as is contemplated in the steel ships now building and designed, running from 6000 up to nearly 10,000 tons displacement, will be much more serviceable than the slow-going and smaller 3500-ton wooden ships. That has been demonstrated by the evolution of transportation on the Great Lakes.

"It was good business policy for General Goethals, in view of the demand to put on the high seas as quickly as possible as many ships as we could, to utilize small shipyards for the building of wooden ships; but General Goethals was absolutely right in his primal position, that if we are going to cope with the enemy so far as shipping facilities are concerned, and get the greatest output in the shortest time, we must have steel ships in greatest number, and not only to have them serviceable during the war, but to have an effective means of transportation on the high seas which would not be mere junk after the war."

The Canody Otto Mfg. Co., Chicago Heights, Ill., has increased its capital stock from $260,000 to $300,000.

Tie Plate Order

For Government's Military Road Placed—Portable Track Wanted

New York, Sept. 17.—A contract for 1,000,000 tie plates, or 3700 tons, for the American military railroad in France, has been placed with the Bethlehem Steel Co. The French government again is reviving a recent inquiry for material for portable tracks behind its troop lines. The quantity originally specified has been cut down and prices now are wanted on from 10,000 to 15,000 tons of rails and accessories.

A new inquiry calls for 20,000 axles for Russian cars. Car business, apart from the government requirements, remains quiet. The Pennsylvania Lines West are asking prices on 500 flat cars. The Presed Steel Car Co. has taken seven ore cars for the Birds Tunnel & Smelting Co.

Jobbers Buying Spikes

Pittsburgh, Sept. 18.—Jobbers are taking small tonnages of standard spikes for prompt delivery at 7c, base, from an independent producer in this district. Sales of small spikes are extremely limited and this apparently is due partly to the fact that a number of coal mines have closed down as a result of the government price of $2, mines, for bituminous fuel. Mills are in a position to supply rather liberal lots of these spikes. The government is pressing mills for early shipments on heavy contracts which it has placed. It is also in the market for approximately 3000 kegs of spikes and for a fair lot of tie plates and general track equipment. Orders of the war department for standard rails for shipment to France keep the mills operating heavily. It is believed that the war department is about to place additional requirements for track equipment. Large makers are well filled with contracts for both light and standard rails for the remainder of the year, a small portion of the tonnage being for private consumption.

Gear Makers

Meet in Convention at Chicago and Discuss Shop Subjects

The American Gear Manufacturers' Association held its semi-annual session in Chicago, Thursday, Friday and Saturday, Sept. 13, 14 and 15, at the Edgewater Beach hotel. The association numbers among its members practically all of the prominent gear manufacturers in the country. The Chicago session was the largest of any yet convened. Special importance was attached to the present meeting because of the members' desire to effect as much standardization in gear products as possible—this in common with the government's desires for all industry, now that the war is making special demands upon all manufacturers and users of materials.

F. W. Sinram of Van Dorn, Dutton & Co., Cleveland, president of the organization, opened sessions Friday morning. A paper on "Advertising Don'ts" was read by J. C. McQuiston, advertising manager of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. W. H. Phillips of R. D. Nuttall Co., Pittsburgh, followed it with a talk on the "Heat Treating and Hardening of Gears".

In the afternoon the convention men were the guests of Chicago members. An automobile trip of about 75 miles through Chicago's huge park system was a feature. In the evening a dinner, music, monologues, lantern-slide caricatures and the like provided entertainment for the visitors. Saturday papers by B. S. Waterman, Brown & Sharpe Mfg. Co., on "Inspection of Gearing" by H. E. Eberhardt of the Newark Gear Cutting Machine Co., on "Spur Gearing by the Rotary or Disc Cutting Process", and by F. Schneider of Van Dorn, Dutton & Co., Cleveland, on "Spur Gears by the Shaper Method".

Reduced Prices

May Be Made on Wire by Independents is Report

Pittsburgh, Sept. 18.—New business in the domestic market for wire and wire products remains quiet. Wire nails are being sold somewhat more freely than heretofore, but purchases are limited to the most pressing needs of consumers. Reports are heard that independent makers may reduce their price on nails to the same basis as that of the leading interest, which is $16 a ton lower than the figures of the independents.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, Sept. 17.—All eyes in the metal markets have been turned on Washington the past week. Members of the subcommittee on copper of the council of national defense held several conferences with the national council relative to fixing copper prices, but no information as to the results of these conferences has been given the public. It was rumored that an agreement had been reached but first must be approved by the President, who has been away from the capital. Recent developments have pointed to the probability of government buying of metals coming back to the form of competitive buying. Attorney General Gregory is said to have declared the allotment of high grade spelter by the zinc committee to various producers illegal in principle, which is causing some conjecture in the metal trade as to the possibility of the same ruling applying to other metals, such as lead.

Copper prices have been strong despite the continued uncertainty. Some authorities insist that what the government will decide has little bearing upon the future of the copper market, asserting that labor troubles are causing a shortage of supplies. The stand of producers gives some backing to this view. It is now difficult to buy September copper under 27.50c. One large producer is asking 28c for October, while 27c is about the minimum for fourth quarter. Electrolytic quotations are about as follows: Spot and September, 27.50c; October, 27c to 27.50c; fourth quarter, 26.75c to 27c. Prompt prime lake copper is quoted nominally 27c to 27.50c. Spot casting copper continues scarce and nominally quoted 27c.

The government has asked for competitive bids on 1000 tons of prime western spelter. The general spelter market is dull, but is holding firm, all prices below 8c having disappeared. It might be possible today to obtain a little prompt shipment prime western at 8c, St. Louis, but the general quotations are as follows: Prompt and September, 8.12½c, St. Louis; fourth quarter, 8.25c. Brass special is quoted 8.75c to 9c St. Louis for prompt shipment. High grade spelter is quoted 13.50c, St. Louis.

The American Smelting & Refining Co. has reduced its lead price 1c a pound more, now quoting 9c, New York. This reduction is the sharpest in the recollection of the lead trade and follows general shading by outside sellers. Buyers are more confused than ever and practically no inquiry for lead is pending. Lead quotations in the outside market are about as follows: Prompt and September shipment, 8.75c, St. Louis; October, 8.62½c.

The antimony market witnessed a little flurry last week, when a consumer entered the market for about 100 tons. This revived interest suddenly and prices stiffened 1c a pound in a few hours, advancing from about 14.25c to 15.25c for nearby delivery, duty paid. Chinese and Japanese brands for spot, September and October delivery are quoted 15c to 15.50c, duty paid.

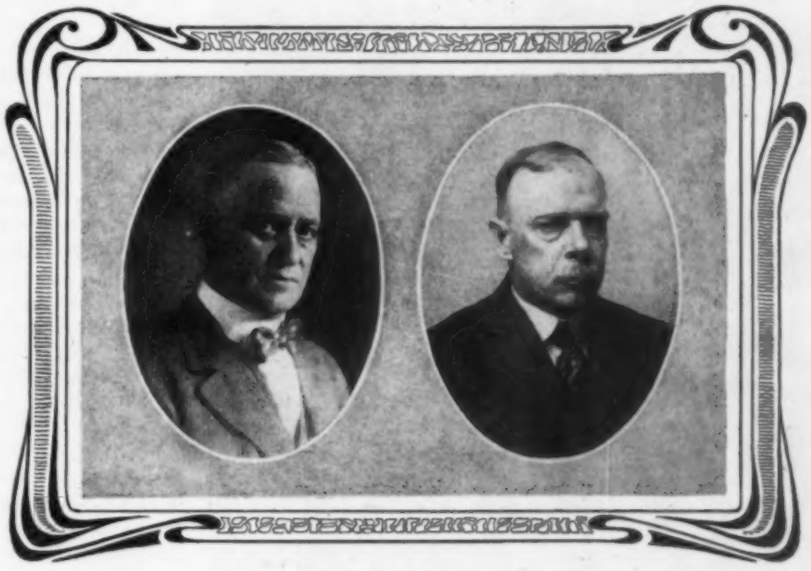
Although supplies of aluminum are limited, demand is even lighter and the scaling down of prices in the outside market continues sharp. Quotations follow: No. 1 virgin, 43c to 46c; No. 1 remelted, 42c to 46c; No. 12 alloy, 33c to 37c.

The tin market has been showing more strength than in several weeks and a good volume of inquiry has been in the market. The sinking of the MINNEHAHA with a reported large cargo of Straits tin affected sentiment. Spot Straits tin today is quoted 62.75c to 63c; Banca and Billiton, 60.50c to 61c; No. 1 Chinese, 99 per cent, about 55.50c.

Boston Awaits Entry of Foundrymen

Final Details Complete for Making 1917 Annual Meeting of American Foundrymen's Association and American Institute of Metals an Unprecedented Success—Condensed Program and List of Exhibitors

DURING the week of Sept. 24, the attention of foundrymen will be focused on Boston, where for the first time in 15 years, members and guests of the American Foundrymen's Association and the American Institute of Metals will assemble for their annual convention. Singularly enough, the meetings will be held less than 10 miles from the spot where the first casting made in America was poured by Joseph Jenks, in 1642. The foundrymen who avail themselves of New England's hospitality during the week of Sept. 24 will find that the work carried on by the allied foundry associations has grown to remarkable proportions. Whereas the attendance at the Boston convention in 1902 was less than 300, more than 3000 foundrymen undoubtedly will be present at next week's convention. In the first New England meeting, only three days were required for the program. This year, by an arrangement of simultaneous sessions covering a period of five days, approximately 50 papers and reports on steel, gray iron and malleable subjects, will be presented. Moreover, the meetings devoted to the discussion of technical papers and the transaction of business, are so scheduled that the afternoons will be left free for the inspection of exhibits, entertainment and sightseeing.



J. P. PERO, PRESIDENT, AMERICAN FOUNDRYMEN'S ASSOCIATION. JESSE L. JONES (RIGHT), PRESIDENT, AMERICAN INSTITUTE OF METALS

During the 15 years that have elapsed since the first New England convention, the exhibits which formerly were limited to placards in hotel corridors have grown to such dimensions that they will tax the capacity of Mechanics' hall, the largest exhibition building in Boston. The one society has developed into two, the American Institute of Metals being the outgrowth of the brass section of the American Foundrymen's Association. The membership of the latter organization also has grown five-fold, until it numbers among its active supporters the most progressive foundrymen, not only of the United States, but Canada and other foreign countries as well. Since its first meeting in Boston, the American Foundrymen's Association has taken the lead among the societies of casting manufacturers and has made a place for itself in the front rank of the technical bodies of the world.

One of the features of the program of both organizations is the predominance of papers devoted to the manufacture of implements of war. With foundrymen everywhere enlisted in the service of the country in this great crisis, an opportunity will be presented to study the methods of those who have been most successful in making munitions. This entire event will be a patriotic demonstration of the preparedness of the foundry industry to come to the aid of the country at this time. The large number of labor-saving tools and equipment that will be displayed in Mechanics' building will point the way to increased output.

The technical sessions of the American Foundrymen's Association will be held in Paul Revere hall and in an adjoining room in Mechanics' building, while the American Institute of Metals will meet at the Hotel Somerset, where its headquarters will be established, with the exception of Monday afternoon when a joint session will be held with the American Foundrymen's Association in Paul Revere hall. Registration for both societies will be in Mechanics' building throughout the week, and the headquarters for the American Foundrymen will be at the Copley-Plaza hotel. The exhibition of foundry supplies and equipment, machine tools and accessories, in Mechanics' building, will be formally opened Monday at 1 p. m. In extent and number of exhibits, it will greatly surpass the show at Cleveland last year. The operating exhibits will be grouped in sections in Mechanics' building, and the display of molding machines and machine tools promises to eclipse anything of its kind ever undertaken. Mechanics' building practically will be converted into a large foundry and machine shop and demonstrations will be made of the operating and economy-producing features of the latest and most modern equipment.

An entertainment program has been outlined by the foundrymen's committee that measures up to the noted hospitality of New England. On Tuesday afternoon the visitors will be taken on a boat ride in and about Boston harbor, with a stop at Nantasket beach. Wednesday afternoon the foundrymen will be guests at Fenway park to witness a baseball game between the Boston and Cleveland American League teams and in the evening they will attend Keith's theater. Thursday afternoon the General Electric Co. will entertain the visitors at its West Lynn plant where luncheon will be served. The annual

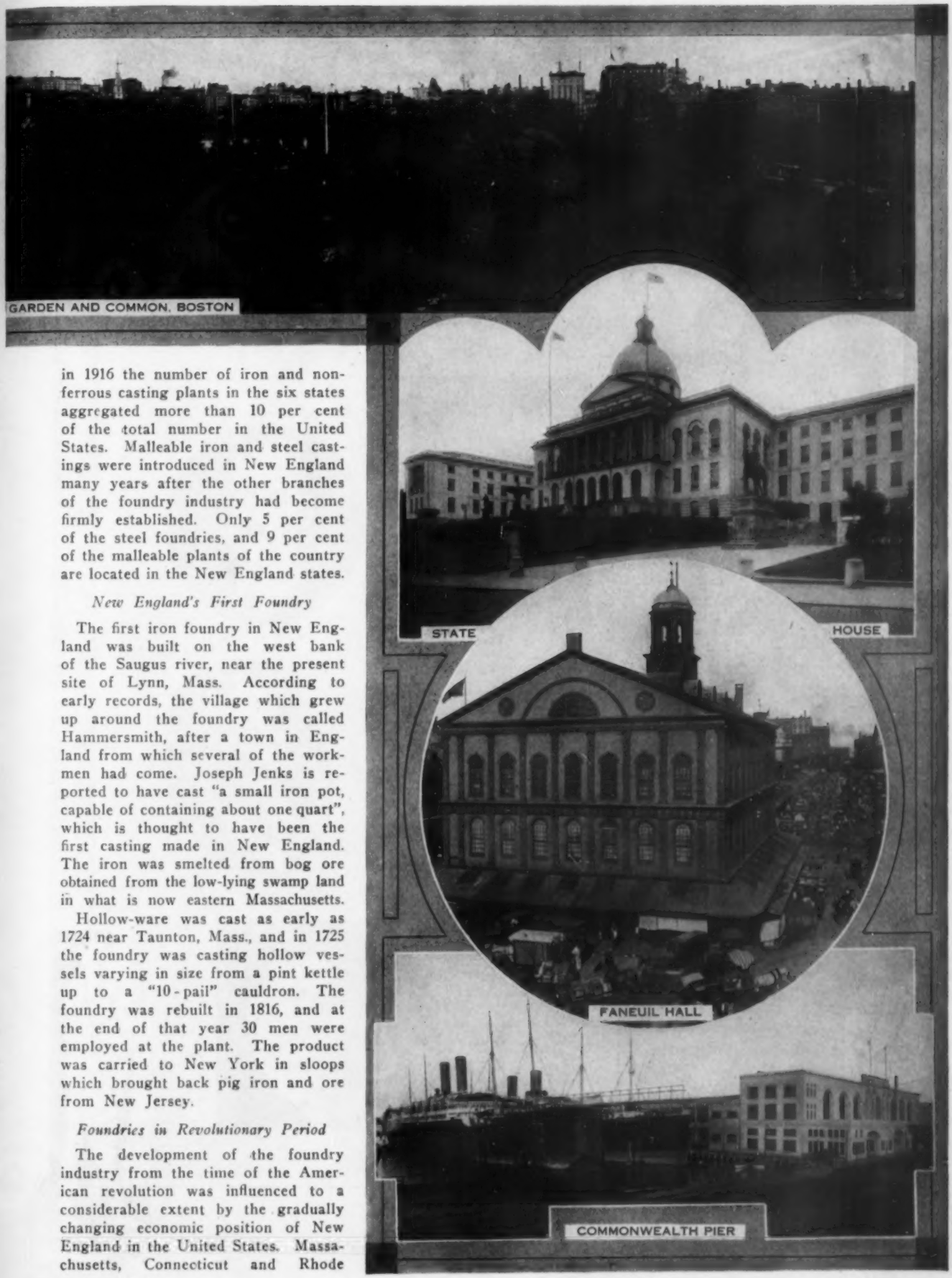
banquet will be held Thursday evening at the Copley-Plaza hotel. Two speakers of national reputation will deliver patriotic addresses and the entertainment features will be in accord with the occasion. While facilities for plant visitation will be afforded throughout the week, Friday has been specially set apart for this feature. The Walker & Pratt Mfg. Co. will permit of an inspection of its large stove plant at this time and a similar opportunity was presented to the visiting foundrymen at Boston 15 years ago. During this period these works have undergone remarkable development.

Ladies' Entertainment

For the ladies an extensive program of entertainment also has been provided. They will be the guests of the New England foundrymen on the boat ride on Tuesday, at Fenway park Wednesday afternoon and at Keith's theater in the evening. Thursday noon they will be tendered a luncheon to be followed by a sight-seeing automobile trip and in the evening they are specially invited to the banquet at the Copley-Plaza hotel, nearly 150 having availed themselves of this opportunity at Cleveland last year.

New England as a Foundry Center

New England, entering its 275th year in the casting of metals, has attained a position in the foundry industry of the United States which bids fair to remain unshaken as long as manufacturing retains its firm grip on the north Atlantic coast. Of the 6000-odd foundries in the country at the present time, over 600, or about 10 per cent are situated in the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. Gray iron and brass castings were among the earliest products of the New England colonies, and



in 1916 the number of iron and nonferrous casting plants in the six states aggregated more than 10 per cent of the total number in the United States. Malleable iron and steel castings were introduced in New England many years after the other branches of the foundry industry had become firmly established. Only 5 per cent of the steel foundries, and 9 per cent of the malleable plants of the country are located in the New England states.

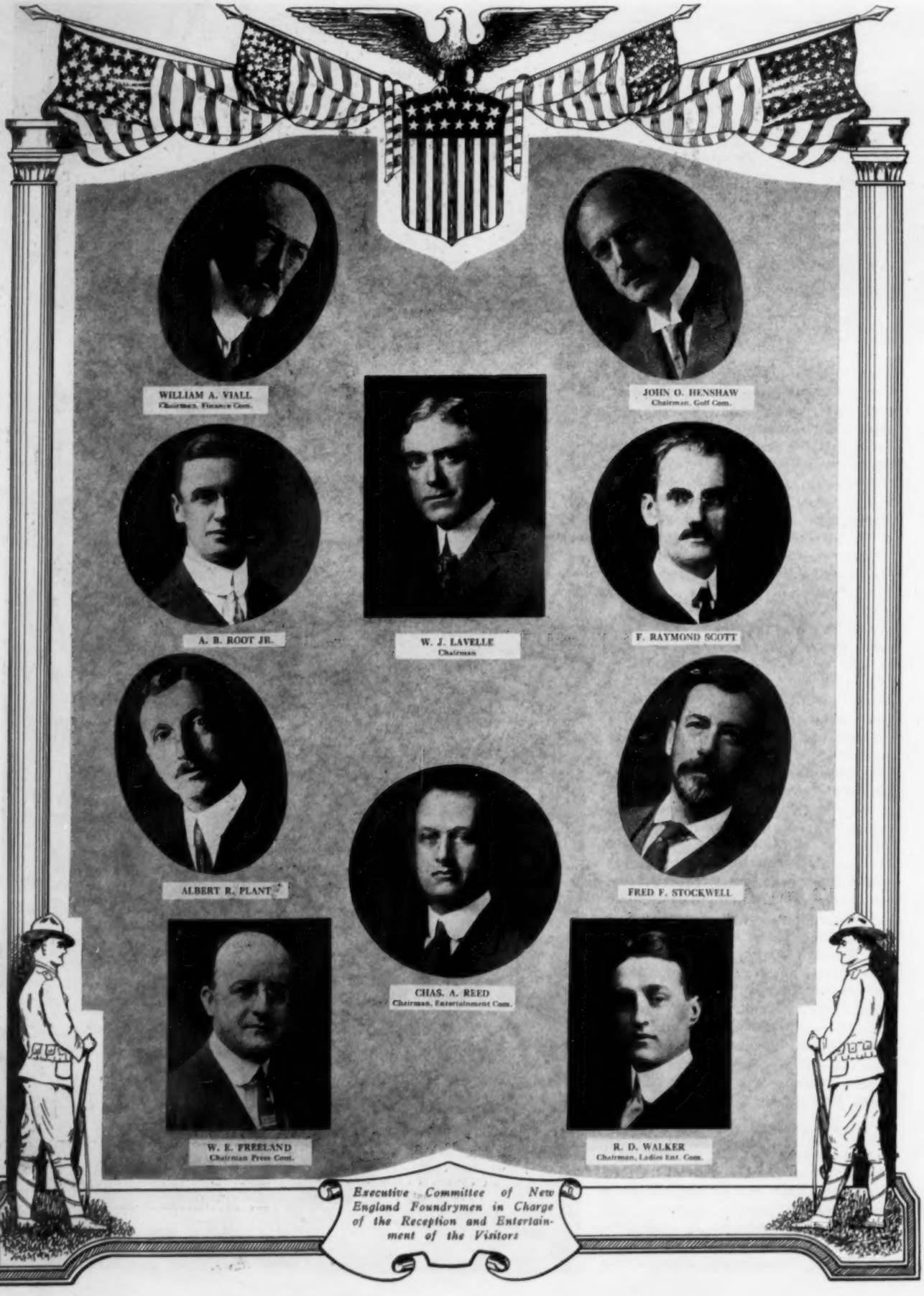
New England's First Foundry

The first iron foundry in New England was built on the west bank of the Saugus river, near the present site of Lynn, Mass. According to early records, the village which grew up around the foundry was called Hammersmith, after a town in England from which several of the workmen had come. Joseph Jenks is reported to have cast "a small iron pot, capable of containing about one quart", which is thought to have been the first casting made in New England. The iron was smelted from bog ore obtained from the low-lying swamp land in what is now eastern Massachusetts.

Hollow-ware was cast as early as 1724 near Taunton, Mass., and in 1725 the foundry was casting hollow vessels varying in size from a pint kettle up to a "10-pail" cauldron. The foundry was rebuilt in 1816, and at the end of that year 30 men were employed at the plant. The product was carried to New York in sloops which brought back pig iron and ore from New Jersey.

Foundries in Revolutionary Period

The development of the foundry industry from the time of the American revolution was influenced to a considerable extent by the gradually changing economic position of New England in the United States. Massachusetts, Connecticut and Rhode



Executive Committee of New England Foundrymen in Charge of the Reception and Entertainment of the Visitors

Island, which for many years had provided the other states with practically all of the manufactured goods which they used, were obliged to relinquish their hold on several important industries. The blast furnaces of Salisbury gave way to those in the Pittsburgh district, and several other lines of manufacturing were established in the west where raw materials were more easily obtained. In the meantime, however, the Yankee ingenuity of the New Englanders had given them a firm hold on certain industries, many of which are peculiar to New England to this day. Clocks, small tools, hardware, paper, cotton and wooden cloth, silverware and fine machine tools and brass goods became the principal products, and it is to the success achieved in producing these articles that the foundry industry in New England owes its prosperity.

In general, the majority of New England foundries are engaged in making castings for the machinery which produces the typical products enumerated, and in providing rough castings from which the products are made. The output of many foundries is required to supply the 900 boot and shoe manufacturing establishments of Massachusetts with the necessary machine equipment. This is also true of the hundreds of textile plants, the 300 carriage and wagon shops, the 800 machine tool builders, 100 manufacturers of electrical machines, etc. Another outlet for castings are the lathes, chucks, planers, shapers, drill presses, levels, planes, motors, sewing machines, meat choppers, printing presses, laundry machines, locks, typewriters, adding machines, engines, marine motors, propellers, gun mounts and carriages, etc., which are turned out by the thousands in New England's many shops. The foundry industry supplements other lines of manufacturing, and is indispensable to the future development of the district. There were 372 casting plants producing gray iron in New England in 1916. A careful study of the distribution of these foundries throughout the towns and villages of New England shows that the plants are widely scattered. There are few towns, even the smallest villages, which do not boast of a foundry. In size, the castings shops vary from those which melt a few tons at irregular periods to the larger ones which melt upwards of 150 tons daily. That a large percentage of the foundries, especially those in outlying towns and villages, are small, is indicated by the thirteenth census report for Connecticut which shows that of the 403 establishments listed as "foundries and machine shops", 18 employed no wage earners, 116 employed from one to five, 85 from six to 20, 69 from 21 to 50, 40 from 51 to 100, 44 from 101 to 250, 16 from 251 to 500, eight from 501 to 1000, and seven over 1000 employes. In other words, about 50 per cent of the plants employ less than 20 men.

Condensed Program

For Complete Program See Pages 453 and 454, Aug. 30, 1917, issue of THE IRON TRADE REVIEW

Monday, Sept. 24

10:00 A. M.—Registration, Mechanics' building.

1:00 P. M.—Opening of the exhibition, Mechanics' building.

3:00 P. M.—Joint opening session, American Foundrymen's Association and American Institute of Metals, Paul Revere hall, Mechanics' building.

Tuesday, Sept. 25

9:30 A. M.—Professional session, American Institute of Metals, Hotel Somerset, for the discussion of the melting and casting of nonferrous metals.

10:00 A. M.—Professional session, American Foundrymen's Association, Paul Revere hall, Mechanics' building; general topics.

1:30 P. M.—Boat ride, in and about Boston harbor. Luncheon will be served on board.

Wednesday, Sept. 26

9:30 A. M.—Professional session, American Institute of Metals, Hotel Somerset, for the discussion of the uses of nonferrous metals for munitions.

10:00 A. M.—Professional session, American Foundrymen's Association, Paul Revere hall, Mechanics' building; cost-keeping in foundries and general topics.

10:00 A. M.—Malleable session, Mechanics' building.

3:00 P. M.—Baseball game, Fenway park, Boston and Cleveland American League teams.

8:15 P. M.—Theater party.

Thursday, Sept. 27

9:30 A. M.—Professional session, American Institute of Metals, Hotel Somerset, for the consideration of the testing of metals.

10:00 A. M.—Gray iron session, American Foundrymen's Association, Paul Revere hall, Mechanics' building

10:00 A. M.—Steel session, American Foundrymen's Association, Mechanics' building.

12:00 M.—Luncheon for the ladies, followed by an automobile sightseeing tour.

12:30 P. M.—Visit to the West Lynn plant of the General Electric Co. Lunch will be served at the works.

7:00 P. M.—Annual banquet, Copley-Plaza hotel.

Friday, Sept. 28

9:30 A. M.—Professional session, American Institute of Metals, Hotel Somerset, for the discussion of metallurgy and metallography.

10:00 A. M.—Professional session, American Foundrymen's Association, Paul Revere hall, Mechanics' building; general topics.

10:00 A. M.—Steel session, American Foundrymen's Association, Mechanics' building.

Plant visitation.

The larger gray iron foundries are in many cases departments of extensive manufacturing plants. This is especially true of the foundries making castings for textile and electrical machinery and machine tools. A number of the gray iron jobbing foundries have developed comparatively large volumes of business, one concern of this kind in southern New England having a capacity of about 150 tons daily. Manufacturing stoves is an important branch of the gray iron foundry industry in New England. According to late figures there are about 20 stove foundries in this section, half of this number being in the state of Massachusetts.

There are 347 foundries in New England casting brass and 229 melting aluminum. Brass is melted exclusively in 188 of these foundries, and in the remaining 159, brass is only one of two or more metals cast. The growth of the brass foundry industry in Massachusetts and Connecticut has been stimulated by the success of hardware manufacture in these states and by the demand for brass castings for machinery. It is not surprising that 104 brass foundries are in Connecticut, for almost nine-tenths of the rolled brass products manufactured in the United States are made in that state. While many of the brass foundries are identified with concerns primarily engaged in the rolled brass industry, the product of a large number of the casting plants finds its way into builders' hardware, machine bearings, valves and fittings, plumbers' goods, etc. According to *Penton's Foundry List*, there were 18 malleable iron foundries in New England in 1916. Without exception, the 11 malleable plants in Connecticut are situated in the southwestern part of the state, and most of them are in the Naugatuck valley. Four of the largest malleable casting plants are controlled by a single company, which operates similar plants in other eastern states. The product of the Connecticut malleable foundries is used in hardware specialties; fittings for gas, steam and water lines; laundry machinery; railway car castings, etc. Two of the four malleable plants of Massachusetts are in Boston, and there is one malleable foundry in Rhode Island and one in New Hampshire.

Manufacturing steel castings was not attempted in New England until long after the other branches of the foundry industry had been firmly established. New Hampshire, Vermont, Massachusetts and Connecticut

were making steel castings in 1880 and Massachusetts, Rhode Island and Connecticut were producing converter steel castings in the early part of the present century. One manufacturer of electrical machinery was operating three basic open-hearth furnaces in 1905 with a daily capacity of 45 tons. A foundry and machine company in that year had a crucible plant of 100 pots with a capacity of 4 tons daily. A Connecticut steel foundry was then producing 3½ tons per day.

In 1916 there were two steel casting plants in Connecticut, 13 in Massachusetts and one in Rhode Island. Of the total number in New England, about one-half are operated as departments of manufacturing companies which use steel castings in their primary products. The others are departments of jobbing foundries, some of which are equipped to cast brass, gray iron, malleable iron and steel. The jobbing steel foundry, producing steel castings exclusively, has not gained the foothold in New England that it has in the middle west, where

The electric steel industry is comparatively new in New England, and promises to become firmly established in a few years. The first electric furnace in this part of the country was installed by a tool and hardware manufacturer to make castings for his own use. Strangely enough, the first jobbing electric steel foundry, completed a few months ago in Hartford, more nearly approaches the type of plant adopted in Pennsylvania, Ohio and Illinois than any other foundry in New England. Wherever most of the foundries in the east are of mill construction, employing wood almost exclusively, this electric steel plant is constructed of sheet metal on steel framework, steel sash providing unusually large window areas. A 2-ton heroult furnace is now in operation and another will be installed as soon as the buildings now about to be erected are completed. The Connecticut Electric Steel Co., which operates this plant, designed it for making small castings, but quickly engaged in making gun mounts for the United States navy and castings for anti-aircraft truck mounts for the army. Thus New England's first electric steel foundry has entered a field of extreme usefulness in assisting the government to wage war.

New England foundries are assuming their fair share in producing castings for the government's war needs. The manufacture of ships, gun mounts, ammunition, wire goods, stoves and other cantonment equipment is imposing a demand for castings to which the foundries are nobly responding. In many casting plants a large proportion, and in a few all of the capacity is engaged in government work.

The mid-year period of 1917 finds the foundry industry in an unusually prosperous condition. According to various sources of information, it is estimated that there are now 622 casting plants operating in New England.

The Durbin Co., St. Louis, manufacturer of flexible pipe joints, will build a malleable foundry of 20-ton daily capacity to manufacture its own castings and do a jobbing business. It is planned to have the foundry in operation in December.

Members, New England Convention Committees

Executive Committee

W. J. Lavelle, chairman, New England Coal & Coke Co., Everett, Mass.
J. O. Henshaw, 79 Milk street, Boston.
C. A. Reed, Reed, Fears & Miller, Boston.
R. D. Walker, Walker & Pratt Mfg. Co., Boston.
W. E. Freeland, *The Iron Age*, Worcester, Mass.
A. R. Plant, Blackstone National bank, Providence, R. I.
W. A. Viall, Brown & Sharpe Mfg. Co., Providence, R. I.
Fred F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.
A. B. Root Jr., Hunt-Spiller Mfg. Corp., Boston.
T. R. Scott, Brown & Sharpe Mfg. Co., Providence, R. I.

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H. E. Winlock, Barbour-Stockwell Co., Cambridge, Mass.
George H. Gibby, Gibby Foundry Co., E. Boston, Mass.
W. Scott Thomas, J. W. Paxson Co., Providence, R. I.
F. B. Farnsworth, McLagon Foundry Co., New Haven, Conn.
George A. Ray, Taylor & Fenn Co., Hartford, Conn.
H. W. Woodworth, American Tool & Machine Co., Boston.
Charles Van Stone, Lumsden & Van Stone Co., South Boston, Mass.
D. D. Barlett, Builders Iron Foundry, Providence, R. I.
F. W. Stickle, Capitol Foundry Co., Hartford, Conn.
Robt. E. Newcomb, Deane Steam Pump Works, Holyoke, Mass.
R. C. Fuller, Fuller Iron Works, Providence, R. I.

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H. A. Carpenter, General Fire Extinguisher Co., Providence, R. I.
W. J. Breen, Wm. J. Breen Co., Boston.
A. N. Abbe, American Hardware Corp., New Britain, Conn.
A. R. Plant, Blackstone National Bank, Providence, R. I.
A. J. Miller, Whitehead Bros. Co., Providence, R. I.
W. C. Fish, General Electric Co., Lynn, Mass.
L. G. Kibbe, Turner & Seymour Mfg. Co., Torrington, Conn.

Ladies Entertainment Committee

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L. S. Brown, Springfield Facing Co., Springfield, Mass.
Charles L. Newcomb, Deane Steam Pump Works, Holyoke, Mass.
Robert C. Bird, Broadway Iron Foundry, Cambridge, Mass.
Carl S. Dixon, General Electric Co., Pittsfield, Mass.
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J. F. Lanigan, Davis Foundry Co., Lawrence, Mass.
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S. E. French, Athol Machine Works, Athol, Mass.
T. Officer, Sullivan Machinery Co., Claremont, N. H.
A. F. Corbin, Union Mfg. Co., New Britain, Conn.
H. A. Nealley, Jos. Dixon Crucible Co., Boston.
G. P. Aborn, Blake & Knowles Steam Pump Works, Cambridge, Massachusetts.
C. A. Olson, Walworth Mfg. Co., Boston.
B. S. Leslie, United Shoe Machinery Co., Beverly, Mass.
T. R. Scott, Brown & Sharpe Mfg. Co., Providence, R. I.
Chas. V. S. Paul, R. Estabrook's Sons, Boston.
Charles L. Nutter, Old Colony Foundry, Bridgewater, Mass.
C. E. Hildreth, Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass.
E. B. Freeman, B. F. Sturtevant Co., Hyde Park, Mass.
D. F. Eagan, Hotel Seymour, Lynn, Mass.
T. I. Curtis, Waltham Foundry Co., Waltham, Mass.
A. L. Haasis, Jos. Dixon Crucible Co., Jersey City, N. J.

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C. A. Wyatt, Debevoise-Anderson Co., Boston.
Thomas F. Stokes, Alley & Page Co., Boston.

Press Committee

W. E. Freeland, chairman, *The Iron Age*, Worcester, Mass.
A. W. Howland, New York.
A. O. Backert, Cleveland.

What You Will See at Boston Show

List of Exhibitors, Description of Machines and Equipment to be Shown, and Location of Exhibits in Mechanics' Building—Manufacturers to Display Latest Devices for Modern Foundries

ABELL-HOWE CO., Chicago.—A one-man detachable tongue truck in two or three types, indicative of the manner in which this truck accommodates itself to the handling of various materials, will be exhibited. High speed chain also will be shown, suitable for the driving of blowers, machine tools or for the general transmission of power in foundries and machine shops. A display also will be made of electric hoists; represented by Oliver J. Abell.

AJAX METAL CO., Philadelphia.—In addition to having its space fitted up as a reception room for visiting foundrymen, this company will exhibit its line of ingot metals together with a variety of castings made from them; represented by Frank M. Willeson, G. H. Clamer, Chas. F. Hopkins, Jos. C. Brightbill, and J. Millson Graham.

ALBANY SAND & SUPPLY CO., Albany, N. Y.—A stove built by the Walker-Pratt Mfg. Co., Boston, all the parts of which were cast in Albany sand furnished by the Albany Sand & Supply Co., will be exhibited. In addition this space will be fitted up as a rest room for the many friends of this concern; represented by Lawrence Murray and Chas. H. Bird.

AMERICAN FOUNDRY EQUIPMENT CO., New York.—This exhibit will consist of a sand cutting machine; rotary table sand-blast room; humane sand-blast rotary table in which the operator stands outside and is immune from dust; a large sand-blast tumbling barrel and a new type of humane sand-blast room for handling all kinds of small work; represented by V. E. Minich, H. L. Wadsworth, Hutton H. Haley, J. D. Alexander and Charles G. Smith.

AMERICAN GUM PRODUCTS CO., New York.—The core binder manufactured by this company will be exhibited; represented by Gordon I. Lindsay.

AMERICAN LIGHTING CO., Chicago.—Industrial and railroad flood lights will be exhibited, these units using 750 or 1000-watt standard lights with a glass reflector, highly silvered and polished. These lights are used extensively in foundry operations where night work is carried on; represented by W. J. Davis Jr., F. M. Evans and J. C. Starr.

AMERICAN MOLDING MACHINE CO., Terre Haute, Ind.—A 10-inch jolt-ramming rock-over molding machine, provided with a table 30 x 40 inches, will be shown in operation, as well as a jolt-ramming stripping plate machine with a 12-inch draw and a 24 x 36-inch table; represented by W. C. Norcross and L. J. Cox.

AMERICAN PIPE BENDING MACHINE CO., Boston. — The pipe bending machine built by this company will be shown in operation; represented by Mark Angel, James Heggie, John Heggie and E. P. Blake.

ARCADE MFG. CO., Freeport, Ill.—The line of molding machines to be exhibited by this company will include a 24-inch electrically-operated, roll-over jolt-ramming and pattern-drawing machine; two sizes of jolt-ramming machines, one showing a ferrule plate; piston cope and drag machines; a combined jolt-ramming and squeezer machine; air and hand squeezer machines; midget core jolt-ramming machine; 17½-inch jar-ramming machine and a pouring device; represented by E. H. Morgan, Chas. Morgan, L. L. Munn, R. E. Turnbull, Henry Tscherning, August Christen and G. D. Wolfley.

ARMSTRONG CORK CO., Pittsburgh.—Insulating brick for furnaces, ovens, boiler settings, etc., high pressure covering for steam lines, corkboard insulation for cold storage rooms, cork covering for drinking water systems for mills and factories and cork machinery isolation for deadening the noise of machines, will be displayed. In addition, an electrically-heated furnace will be shown in operation for demonstrating the non-conducting properties of insulating brick.

ATHOL MACHINE CO., Athol, Mass.—Vises of many types and an extensive assortment of mechanics' tools will be displayed. Photographs of the company's plant also will be shown, illustrating the play-grounds, baseball and basket ball fields, club house and safety devices in the company's shops; represented by Stephen E. French and H. K. Parkman.

ATKINS, E. C., & CO., Indianapolis, Ind.—An extensive display will be made of saws of all kinds, including metal-cutting circular saws, hack saw blades, frames, hand saws, metal-cutting machines and foundry plates; represented by T. H. Endicott, W. L. Timpone, Geo. W. Steenberg and Thos. A. Carroll.

AYER & LORD TIE CO., Chicago.—The interior creosoted wood blocks manufactured by this company will be installed in the floor of its booth and photographs and other data, descriptive of this type of material will be shown; represented by A. Y. Noyes, W. H. Blythe, B. S. McConnell, F. W. Decker, R. H. and R. G. Inslee and H. G. Stephens.

B. & B. MFG. CO., Indianapolis.—Several types of the molding machines made by this company will be shown and both power and hand squeezers of the portable and stationary types will be demonstrated.

BEAUDRY & CO., INC., Boston.—A 100-pound power hammer arranged for motor drive and a similar power hammer of 50 pounds capacity, built by the United Hammer Co., Boston, will be displayed; represented by O. H. Abramson and A. Parsons.

BERKSHIRE MFG. CO., Cleveland. — An air squeezer, equipped with a vibrator and a lifting device will be displayed. In addition a complete line of aluminum, wood and iron flasks and special aluminum match-plates will be exhibited; represented by R. H. York, W. A. Price, G. L. Cannon and W. D. Fraser.

BESLY, CHARLES H., & CO., Chicago.—An operating exhibit, consisting of the following machines will be made: A 53-inch vertical spindle disc grinder, 24-inch wide faced ring wheel grinder with 30-inch disc wheel for finish grinding, 20-inch double spindle disc grinder and a 30-inch pattern-makers' disc grinder; represented by Edward P. Wells, Charles A. Knill, Ralph W. Young and J. F. Curns.

BILTON MACHINE TOOL CO., Bridgeport, Conn.—Gear milling and gear hobbing machines for automatically cutting gears up to 10-inch diameter and as coarse as 8 pitch in steel will be exhibited.

BIRKENSTEIN, S., & SONS, Chicago.—A complete line of non-ferrous metals and alloys will be exhibited, including ingot brass, ingot bronze, ingot copper, pig tin, pig lead, solder, babbitt, phosphor-copper, phosphor-tin, manganese bronze, etc. Castings made from these ingots also will be displayed.

BLODGETT, G. S., CO., Burlington, Vt.—Two or three samples of the core-baking ovens manufactured by this company will be exhibited; represented by R. L. Patrick.

BLYSTONE MFG. CO., Cambridge Springs, Pa.—A core sand mixer with screen, motor and power discharge attached will be exhibited; represented by Luther G. Conroe and T. A. Graham.

BRIDGEPORT SAFETY EMERY WHEEL CO., Bridgeport, Conn.—Belt and motor-driven grinding and polishing machinery, together with a number of grinding wheels will be exhibited. A portion of this machinery display will be operated; represented by D. T. Homan.

BROWN SPECIALTY MACHINERY CO., Chicago.—Two styles of core machines, one of which will be operated, and an electric duplex shaker will be shown, in addition to a revolving barrel sand-blast machine equipped with cloth screen type dust arrester and exhaust fan, which will be in operation; represented by Elmer A. Rich Jr., J. E. Sweet, R. E. Laycock, J. L. Laycock and R. G. Coburn.

BUCKEYE PRODUCTS CO., Cincinnati.—Metal melting crucible and non-crucible furnaces will be exhibited as well as air and electric vibrators, parting and core compounds, fluxes, etc.; represented by C. J. Goehringer, D. S. Marfield, B. Bernbaum, C. Gysin, J. B. Carpenter and E. R. Sutton.

CARBORUNDUM CO., Niagara Falls, N. Y.—Carborundum and aloxite wheels, special carborundum wheels for malleable grinding and samples of crude material from which these wheels are made will be shown. The booth of this company also will be fitted up as a rest and reception room for visitors; represented by C. E. Hawke, J. E. Rayner, John MacArthur, H. E. Hammond, G. E. Dresser, O. C. Dobson and H. E. Kerwin.

CATARACT REFINING & MFG. CO., Buffalo.—Core oils, parting compounds, cutting oils and quenching and tempering oils will be exhibited; represented by J. Purvis, A. A. Schaefer, F. F. Hennessy, J. A. MacVeagh, M. E. Becker and F. N. Tweedy.

CHAMPION FOUNDRY & MACHINE CO., Chicago.—An operating exhibit consisting of two electric sand riddles will be made; represented by T. J. and H. O. Magnuson.

CHASE, FRANK D., Chicago. — Photographs of foundries and other industrial plants built by this engineering firm will be displayed; represented by Frank D. Chase and F. H. Sprague.

CHASE TURBINE MFG. CO., Orange, Mass.—A joint exhibit with the Divine Bros. Co., Utica, N. Y., will be made. The Chase company will display a new automatic polishing and buffing machine and Divine Bros. will show compressed polishing wheels, wheel dressers, balancers, etc.; represented by W. G. Chapman, B. H. Divine and F. W. Sturdevant.

CHICAGO PNEUMATIC TOOL CO., Chicago. A pneumatic hoist, pneumatic chipping hammers, rammers and drills, portable electric

drills and grinders, electric sand shakers, hose couplings and other accessories for pneumatic foundry equipment will be exhibited. The compressed air used by exhibitors will be furnished by a large motor driven compressor made by this company; represented by F. S. Eggleston, E. J. Foley and others.

CHISHOLM-MOORE MFG. CO., Cleveland.—Several types of hoists manufactured by this company will be displayed and an aluminum miniature model hoist will be exhibited showing the inside mechanism.

CINCINNATI PULLEY MACHINERY CO., Cincinnati. — Nine motor-driven, ball-bearing drilling machines of different types and speeds, adapted to the varying conditions of machine shop work will be displayed; represented by J. G. Hey, J. F. Merrieless and C. K. Cairns.

CLARK, CHARLES J., Chicago. — Meters employed for measuring the quantity of blast

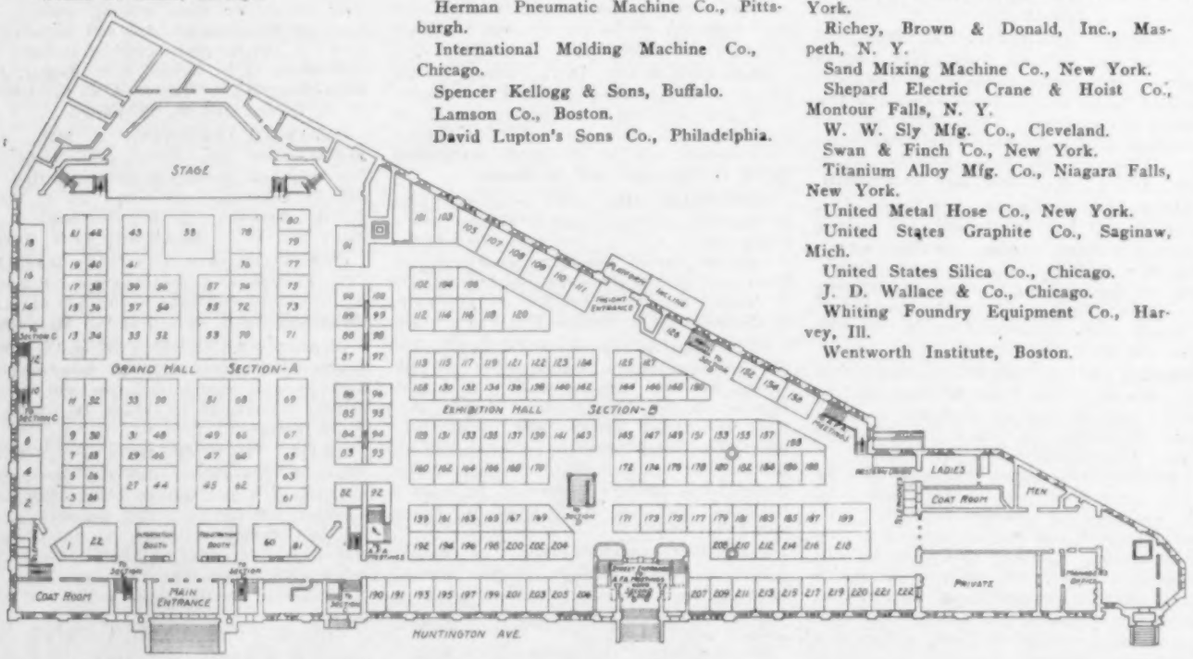
Location of Exhibits

EXHIBITORS IN GRAND HALL—SECTION A

Ajax Metal Co., Philadelphia.
Albany Sand & Supply Co., Albany, N. Y.
American Gum Products Co., New York.
American Lighting Co., Chicago.
Asbury Graphite Mills, Asbury, N. J.
Athol Machine Co., Athol, Mass.
Brass World Publishing Co., New York.
Carborundum Co., Niagara Falls, N. Y.
Cataract Refining & Mfg. Co., Buffalo.
Cleveland-Osborn Mfg. Co., New York.
Combined Supply & Equipment Co., Buffalo.
Daily Iron Trade and Metal Market Report, The, Cleveland.
Debevoise-Anderson Co., New York.
Dixon Crucible Co., Jersey City, N. J.
Eastern Brass & Ingot Corp., Waterbury, Conn.
Felt & Tarrant Mfg. Co., Waterbury, Conn.
Foundry, The, Cleveland.
Foreign Crucibles Corp., Ltd., New York.
General Platers' Supply Co., New York.
Goldschmidt Thermit Co., New York.
Harrison Supply Co., Boston.
Hart & Hutchinson Co., New Britain, Conn.
Hayward Co., New York.
Herman A. Holz, New York.
Iron Age, New York.
Iron Trade Review, The, Cleveland.
Jennison-Wright Co., Toledo, O.
Kelly & Co., T. P., New York.
Julius King Optical Co., Chicago.
Lewis-Shepard Co., Boston.
Ludlum Electric Furnace Corp., New York.
Maclean Publishing Co., Toronto, Ont.
Metal Industry, New York.
Michigan Smelting & Refining Co., Detroit.
New Chicago Crucible Co., Chicago.
New England Coal & Coke Co., Boston.
Norma Co. of America, New York.
O. K. Crucible Co., New York.
J. W. Paxson Co., Philadelphia.
Penton Publishing Co., Cleveland.
Pickands, Brown & Co., Chicago.
Pittsburgh Crushed Steel Co., Pittsburgh.
Robeson Process Co., New York.
Rogers, Brown & Co., Cincinnati.
R. P. Smith & Sons Co., Chicago.
Werner G. Smith Co., Cleveland.
Sterling Wheelbarrow Co., West Allis, Wisconsin.
Strong, Kennard & Nutt Co., Cleveland.
Thomas Iron Co., Boston.
United Compound Co., Buffalo.
Wheeler & Holcomb Co., Chicago.
White & Bro., Philadelphia.
Whitehead Bros. Co., Providence, R. I.
T. B. Wood's Sons Co., Chambersburg, Pennsylvania.

EXHIBITORS IN EXHIBITION HALL—SECTION B

Abell-Howe Co., Chicago.
American Foundry Equipment Co., Cleveland.
American Pipe Bending Machine Co., Boston.
Ayer & Lord Tie Co., Chicago.
Berkshire Mfg. Co., Cleveland.
S. Birkenstein & Sons, Chicago.
G. S. Blodgett, Burlington, Vt.
Blystone Mfg. Co., Cambridge Springs, Pennsylvania.
Buckeye Products Co., Cincinnati.
Champion Foundry & Machine Co., Chicago.
Frank D. Chase, Chicago.
Chisholm-Moore Mfg. Co., Cleveland.
Charles J. Clark, Chicago.
Thos. E. Coale Lumber Co., Philadelphia.
Corn Products Refining Co., New York.
Cutter & Wood Supply Co., Boston.
Dings Magnetic Separator Co., Milwaukee.
G. Drouve Co., Bridgeport, Conn.
Foundry Equipment Co., Cleveland.
General Fire Extinguisher Co., Providence, R. I.
Great Western Mfg. Co., Leavenworth, Kansas.
Hauck Mfg. Co., Brooklyn, N. Y.
Herman Pneumatic Machine Co., Pittsburgh.
International Molding Machine Co., Chicago.
Spencer Kellogg & Sons, Buffalo.
Lamson Co., Boston.
David Lupton's Sons Co., Philadelphia.
J. S. McCormick Co., Pittsburgh.
McLain's System, Milwaukee.
Macleod Co., Cincinnati.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Engineering & Mfg. Co., Baltimore.
Mumford Molding Machine Co., Chicago.
New Haven Sand Blast Co., New Haven, Conn.
S. Obermayer Co., Chicago.
Pangborn Corp., Hagerstown, Md.
Portage Silica Co., Youngstown, O.
Quigley Furnace Specialties Co., New York.
Richey, Brown & Donald, Inc., Maspeth, N. Y.
Sand Mixing Machine Co., New York.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
W. W. Sly Mfg. Co., Cleveland.
Swan & Finch Co., New York.
Titanium Alloy Mfg. Co., Niagara Falls, New York.
United Metal Hose Co., New York.
United States Graphite Co., Saginaw, Mich.
United States Silica Co., Chicago.
J. D. Wallace & Co., Chicago.
Whiting Foundry Equipment Co., Harvey, Ill.
Wentworth Institute, Boston.



supplied to cupolas will be displayed and several new instruments also will be shown, which will prove of interest to those now using blast volume meters; represented by Charles J. Clark.

CLEVELAND BLOW PIPE & MFG. CO., Cleveland.—This exhibit will consist of a motor-driven exhaust fan, various designs of hoods for use on buffing, polishing and emery wheels, dust collector and the necessary material required to connect from the emery wheels to the exhaust fan and from the exhaust fan to the dust collector. The fan is used to create a vacuum from the hoods through the necessary pipe and elbows, discharging into the dust collector which removes the dust from the air by centrifugal force. A two-section shower bath for foundry and factory use also will be displayed. Photographs will be exhibited showing sheet metal specialties made by this company for factory use; represented by Edward Coney.

CLEVELAND MILLING MACHINE CO., Cleveland.—A cutter relieving machine, profile grinder, milling machine and a horizontal boring mill will be shown in operation; represented by L. H. Mesker.

CLEVELAND-OSBORNE MFG. CO., New York.—Wire brushes for use in foundry cleaning rooms will be exhibited.

CLEVELAND PNEUMATIC TOOL CO., Cleveland.—A complete line of air-operated tools for foundry purposes will be shown in operation. This will include pneumatic tools in all sizes for machine shop work, such as riveting hammers, chipping hammers, etc., sand rammers for foundry use as well as air drills, portable casting grinders, air hose, hose couplings, etc.; represented by H. S. Covey, Arthur Scott, Chas. Garner, G. Gregory and F. E. Schwarze.

COALE, THOMAS E., LUMBER CO., Philadelphia. — A remarkable assortment of white pine and sugar pine pattern lumber in several thicknesses, will be displayed; represented by Thos. E. Coale.

COMBINED SUPPLY & EQUIPMENT CO., Buffalo.—Foundry supplies will be exhibited.

CORN PRODUCTS REFINING CO., New York.—The liquid core binder manufactured by this company will be exhibited.

CURTIS PNEUMATIC MACHINERY CO., St. Louis.—The entire exhibit to be made by this company will be operated and will include a vertical double-cylinder single-acting compressor, water-cooled, with a regulating sight feed splash oiling attachment. This compressor will be motor-driven with automatic pressure control and is provided with a circulating pump for cooling water. Hoists and trolleys also will form a part of this display. Pendant vertical cylinder air hoists will be shown as well as a horizontal rope compounded cylinder air hoist, suspended from single I-beam trolleys. Single I-beam hand-operated bridge crane with trolley and a single I-beam bracket jib crane also will be shown; represented by Joseph Macksey.

CUTTER & WOOD SUPPLY CO., Boston. —The large space to be occupied by this company will include the displays of the Chisholm-Moore Mfg. Co., Cleveland, and the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y. The Cutter & Wood Supply Co. is the Boston representative of both of these concerns. In addition to the Chisholm-Moore Mfg. Co., the Shepard Electric Crane & Hoist Co., exhibits, an extensive line of tools and supplies employed in metal casting, cleaning, machining, finishing, electro-galvanizing and plating will be displayed; represented by W. S. Wood and Wm. H. Mulholland.

DAILY IRON TRADE AND METAL MARKET REPORT, Cleveland. — This booth will be fitted up as a rest room for visiting foundrymen and free stenographic service will be provided for the exhibitors and visitors; represented by John A. Penton, A. O. Backert, C. J. Stark, H. Cole Estep, J. D. Pease, F. V. Cole, S. H. Jasper, G. O. Hayes, J. F. Ahrens, Charles Vickers, E. L. Shaner and A. J. Mueller.

DAVIS-BOURNONVILLE CO., Jersey City, N. J.—Oxyacetylene and oxyhydrogen welding and cutting apparatus, acetylene pressure generators, portable outfits, special cutting machines and accessories will be displayed; represented by F. C. Whitney, M. S. Plumley, H. H. Dyar, W. W. Barnes, Alex. Blazer, Geo. Jaeger, G. J. Strobel, F. A. Blood, F. C. Hobbs and G. V. Greene.

DEBEVOISE - ANDERSON CO., INC., New York.—The various brands of bee-hive oven and by-product cokes sold by this company will be displayed, as well as different grades of pig iron, 50 per cent ferrosilicon, limestone and coal; represented by W. Anderson.

DINGS MAGNETIC SEPARATOR CO., Milwaukee.—Four types of power-driven separators will be shown in operation. One of these machines will have a motor attached, another will be provided with a motor generator set, a third will be of the magnetic

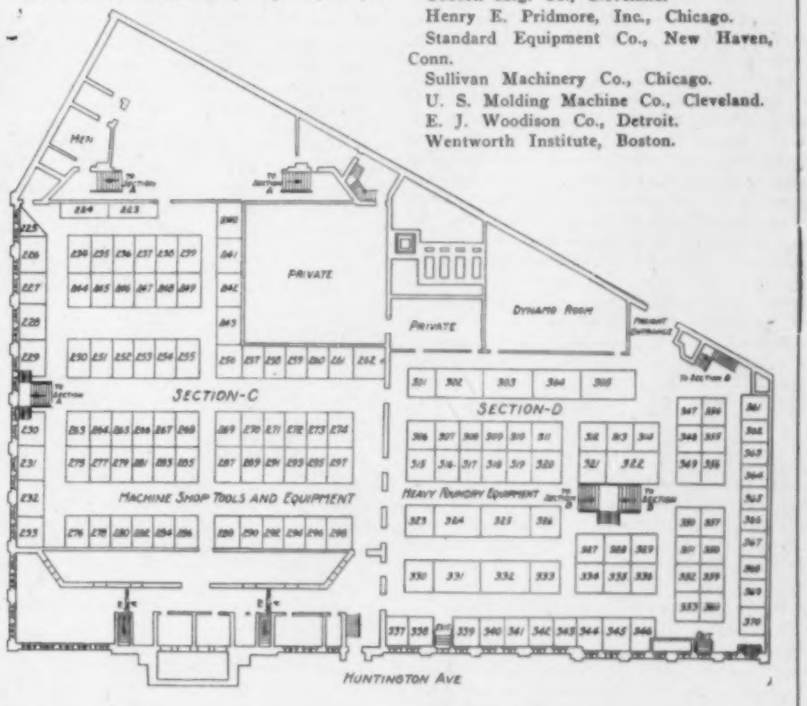
Location of Exhibits

EXHIBITORS IN GRAND HALL BASEMENT—SECTION C

Armstrong Cork & Insulation Co., Pittsburgh.
E. C. Atkins & Co., Indianapolis.
Beaudry & Co., Boston.
Chas. H. Besly & Co., Chicago.
Bilton Machine Tool Co., Bridgeport, Conn.
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Chase Turbine Mfg. Co., Orange, Mass.
Cincinnati Pulley Machinery Co., Cincinnati.
Divine Bros. Co., Utica, N. Y.
Forbes & Myers, Worcester, Mass.
Gardner Machine Co., Beloit, Wis.
General Electric Co., Schenectady, N. Y.
Hill, Clarke & Co., Boston.
Lees-Bradner Co., Cleveland.
Lynd-Farquhar Co., Boston.
McCrosky Reamer Co., Meadville, Pa.
Norton Co., Worcester, Mass.
Oliver Machinery Co., Grand Rapids, Mich.
Oxweld Acetylene Co., Newark, N. J.
Railway Mechanical Engineer, New York.
Rivett Lathe & Grinder Co., Boston.
Simonds Mfg. Co., Fitchburg, Mass.
Warner & Swasey Co., Cleveland.

EXHIBITORS IN EXHIBITION HALL BASEMENT—SECTION D

American Molding Machine Co., Terre Haute, Ind.
Arcade Mfg. Co., Freeport, Ill.
B. & B. Mfg. Co., Indianapolis.
Brown Specialty Machinery Co., Chicago.
Chicago Pneumatic Tool Co., Chicago.
Cleveland Blow Pipe & Mfg. Co., Cleveland.
Cleveland Pneumatic Tool Co., Cleveland.
Curtis Pneumatic Machinery Co., St. Louis.
Davis-Bournonville Co., Jersey City, N. J.
Federal Foundry Supply Co., Cleveland.
Hoevel Mfg. Corp., New York.
Mahr Mfg. Co., Minneapolis.
Malleable Iron Fittings Co., Branford, Conn.
Midland Machine Co., Detroit.
Mott Sand Blast Mfg. Co., Brooklyn, New York.
E. H. Mumford Co., Elizabeth, N. J.
National Engineering Co., Chicago.
Wm. H. Nicholls Co., Brooklyn, N. Y.
Osborn Mfg. Co., Cleveland.
Henry E. Pridmore, Inc., Chicago.
Standard Equipment Co., New Haven, Conn.
Sullivan Machinery Co., Chicago.
U. S. Molding Machine Co., Cleveland.
E. J. Woodison Co., Detroit.
Wentworth Institute, Boston.



pulley type with motor and the fourth will be a hand magnet; represented by Messrs. Fobian and Bethke.

DIVINE BROS., Utica, N. Y.—Will exhibit a wheel dressing machine, automatic glue heater, balancing tool, compress leather polishing wheels, compress, felt polishing wheels, and composition polishing wheels. Bullneck wheels, leather-covered wood wheels and solid canvas wheels will be shown; represented by Frank W. Sturdevant.

DIXON, JOSEPH, CRUCIBLE CO., Jersey City, N. J.—Crucibles, covers, stirrers, stoppers, sand crucibles, scorifiers, cupels, etc., will be displayed; represented by C. A. Johnson, H. C. Sorenson, J. J. Belleville, J. J. Tucker, R. H. Brinkerhoff, C. A. Shaw, E. A. St. John, A. L. Hassis, R. F. Leonard, J. K. Mosen, John A. Condit and H. A. Nealley.

DROUVE, G., Co., Bridgeport, Conn.—An extensive display will be made of samples of puttyless skylight and numerous blueprints and photographs will be shown, illustrating the applications of the sash manufactured by this company.

EASTERN BRASS & INGOT CORP., Waterbury, Conn. — Brass briquette ingots made from various classes of brass chips, brass turnings, etc., will be displayed. The service afforded by this company to producers and consumers of scrap metals consists of converting these finer forms of brass scraps into briquette ingots which are sufficiently solid to withstand commercial handling; represented by Howard Baker, Fred A. Purdy, George G. Hanson and W. S. Lord.

FEDERAL FOUNDRY SUPPLY CO., Cleveland.—An extensive display of molding machines will be made by this company, which will include six different sizes of jolt-ramming machines constructed without valves. When the piston opens the exhaust it automatically shuts-off the intake and the expansion of the air forces the piston the remainder of its travel until the exhaust is fully opened, when the piston drops to the starting point. Six different types of power squeezers and combination jolt and squeezer machines also will be displayed. Extra long cylinders are provided on all squeezers which have extra heavy leather pistons, thereby eliminating the loss of air and effecting economies in air consumption. The plain power squeezers will be shown in two sizes with cylinders 9 and 12 inches in diameter, respectively. Two sizes of the combination jolt-ramming and squeezer machines also will be shown, one having a 9-inch squeezing cylinder and a 4-inch jolting cylinder and the other, a 12-inch squeezing cylinder and 5-inch jolting cylinder. These machines are built both stationary and portable. Four sizes of electric vibrators and knee switches, portable and stationary core ovens provided with swinging doors, also will be shown, as well as samples of plumbago, parting compound, steel cement, wax vent wire, etc., represented by Ralph Ditty, Walter J. Adams, I. D. Adams, Ellsworth Kaye, W. J. Smith and John Bayer.

FELT & TARRANT MFG. CO., Chicago.—The adding and calculating machines manufactured by this company will be displayed and demonstrations in their application to inventory, payroll, cost work, billing, etc., will be made; represented by William F. Sims.

FORBES & MYERS, Worcester, Mass.—Polishing and buffing machines will be displayed.

FOREIGN CRUCIBLES CORP., LTD., New York.—Samples of the imported graphite crucibles sold by this company will be shown; represented by Geo. H. Ames.

FOUNDRY EQUIPMENT CO., Cleveland.—Core and mold ovens, core cars, melting furnaces, oil burners, etc., will be displayed; represented by F. A. Coleman and C. A. Barnett.

THE FOUNDRY, Cleveland. — This booth will be fitted up as a rest room for visiting foundrymen and free stenographic service will be provided for the exhibitors and visitors; represented by John A. Penton, A. O. Backert, C. J. Stark, H. Cole Estep, J. D. Pease, F. V. Cole, S. H. Jasper, G. O. Hayes, J. F. Ahrens, Charles Vickers, E. L. Shaner and A. J. Mueller.

GARDNER MACHINE CO., Beloit, Wis.—Belt and motor-driven disc grinders, as well as samples of work done on disc-grinding machines will be exhibited.

GENERAL ELECTRIC CO., Schenectady, N. Y.—One of the features of this exhibit will be an electrically-operated core oven furnished by the Oven Equipment Co., New Haven, Conn. It will be equipped with six General Electric heating units operating at a maximum capacity of 21 kilowatts, and arranged for service on a 220-volt, 60-cycle, 3-phase, alternating current circuit. The other equipment includes a control panel, a mercury-actuated thermostat and a recording thermometer. The oven will be heated to an average of 350 to 500 degrees Fahr. In addition, a centrifugal air compressor for furnishing blast to cupolas will be displayed. These compressors now are widely used and are particularly adapted for cupola service because of the non-pulsating character of the blast, with motor or turbine drive. Operating with a direct current motor the drive pressure is regulated by changing the speed of the set by motor field rheostat. For induction motors arranged for constant speed and pressure, the blast is regulated in place of the motor; represented by J. M. Hollister, M. R. Griffith, A. R. Bush, W. C. Fish, C. B. Davis, J. F. Steele and D. G. Brokaw.

GENERAL FIRE EXTINGUISHER CO., Providence, R. I.—The automatic sprinkler system built by this company will be installed in a wire-glass house for the purpose of demonstrating its methods of operation and that of the American District Telegraph supervisory system. Motion pictures also will be shown several times daily featuring the operation of this system and the Grinnell automatic sprinkler head which forms an important part of it. A method of gas heating for domestic and industrial purposes also will be demonstrated; represented by W. A. Kennedy, A. J. Richmond, R. A. Jenckes, J. D. Pryor, George S. Barrows and Carl Hausler Hale.

GENERAL PLATERS' SUPPLY CO., New York.—Some of the equipment made by this company, which includes electric plating machinery, dynamos, etc., will be exhibited.

GOLDSCHMIDT THERMIT CO., New York.—A large weld on a crank shaft made by the thermit process will be exhibited, as well as a complete line of samples of all of the carbon-free metals and alloys made by this company including tungsten, chromium-manganese, ferro - chromium, ferro - tungsten, manganese-copper, cobalt, etc.; represented by Arthur F. Braid, H. G. Spilsbury, J. G. McCarty, W. R. Hulbert and H. D. Kelley.

GREAT WESTERN MFG. CO., Leavenworth, Kans.—Three types of gyratory foundry riddles, as well as a new riddle designed for bench work will be shown; represented by F. A. Pickett and George W. Combs.

HARRISON SUPPLY CO., Boston.—Metallic sand-blast abrasives will be exhibited, including chilled shot and crushed shot for sand-blast purposes; represented by Nathan C. Harrison, J. Henry Duclos Jr., Charles R. Dawson, B. L. Snow and E. E. Ricker.

HART & HUTCHINSON, New Britain, Conn.—Steel lockers, shop boxes, tool cabinets, shelving, and other metal shop equipment manufactured by this company will be exhibited.

HAUCK MFG. CO., Brooklyn, N. Y.—Cupola lighters, mold dryers, ladle and rivet heaters, torches and forges will be exhibited; represented by A. E. Hauck, Busch Hauck and A. P. Link.

HAYWARD CO., New York.—Photographs of the equipment built by this company for handling various materials with different kinds of hoisting apparatus will be exhibited; represented by H. M. Davison and C. F. Hutchings.

HERMAN PNEUMATIC MACHINE CO., Pittsburgh. — A plain jar-ramming molding machine and a combination jar-ramming and squeezer machine will be exhibited, but will not be operated; represented by Thos. Kaveny, H. T. Frauenheim, A. M. Frauenheim, Alfred Herman, Robt. F. Ringle, I. J. Oesterling, R. P. Morgan, Walter Hughes, A. McWithey, Robt. Porteous and Harry W. Gahan.

HILL, CLARKE & CO., Boston.—The extensive display of machine tools to be made by this company will be operated.

HOEVEL MFG. CORP., New York. — A rotary table sand-blast machine and a revolving barrel sand-blast machine, built by this company, will be shown in operation; represented by H. F. Hoevel, F. W. Weiss, L. B. Passmore and G. H. Seltzer.

HOLZ, HERMAN A., New York City.—A portable apparatus for determining the hardness of metals will be shown.

INTERNATIONAL MOLDING MACHINE CO., Chicago.—Electric and air jar-ramming molding machines, power squeezers, combination jolt squeezers, combination stripping squeezers, hand turn-over pattern-drawing machines, power turn-over power pattern-drawing machines, combination jar-ramming machines of the turn-over pattern drawing, power turn-over foot pattern-drawing and power turn-over power pattern-drawing types, as well as stripping plate machines will be exhibited; represented by Edward A. Pridmore, W. W. Miller, F. W. Hamel and J. L. Lanigan.

THE IRON TRADE REVIEW, Cleveland.—This booth will be fitted up as a rest room for visiting foundrymen and free stenographic service will be provided for the exhibitors and visitors; represented by John A. Penton, A. O. Backert, C. J. Stark, H. Cole Estep, J. D. Pease, F. V. Cole, S. H. Jasper, G. O. Hayes, J. F. Ahrens, Charles Vickers, E. L. Shaner and A. J. Mueller.

JENNISON-WRIGHT CO., Toledo, O.—Creosoted wood blocks for factory floors will be displayed; represented by H. G. Jennison, Lloyd P. Drinker and Frank B. Goodman.

KELLOGG, SPENCER & SONS, INC., Buffalo.—Liquid core binders and pure linseed oil will be exhibited; represented by A. P. Mason, W. L. Goetz and R. C. Boggess.

KELLY, T. P., & CO., INC., New York.—The exhibit space reserved by this company will be arranged as an office and rest room for the convenience of the large number of friends of this concern; represented by H. F. Maurel, B. H. Forman, F. J. Rohe, H. J. Winters, V. C. Smith and W. F. Kaine.

KING, JULIUS, OPTICAL CO., New York. Safety goggles, helmets and safety appliances will be exhibited; represented by W. G. King, F. W. King, A. G. Larson, and J. J. Duffy.

LAMSON CO., Boston.—Conveyors of various types for foundry and general industrial use will be displayed. These include a gravity roller conveyor for handling pig iron, cores, etc., a parcel overhead carrier for carrying cores and other material from one foundry department to another, etc. All of the labor-saving and time-saving devices built by this

company will be demonstrated by full size models and by photographs of installations. The American Pneumatic Service Co., which controls the 8-inch postal tubes operated in five cities of the country, will co-operate with the Lamson Co. in making this exhibit; represented by Fred B. Barton.

LEES-BRADNER CO., Cleveland.—A machine tool exhibit will be made by this company under the direction of its Boston agent, the Lynd-Farquhar Co. The exhibit will consist of a standard thread miller and a gear generator; represented by E. A. Bayton.

LEWIS-SHEPARD CO., Boston.—Elevating trucks which make possible the system of handling goods on platforms will be displayed; represented by A. L. Lewis, J. W. Adams and E. E. Wallace.

LUDLUM ELECTRIC FURNACE CORP., New York.—A model of the new Ludlum electric furnace with samples of tool steel, pig iron, washed metal, iron and steel castings, etc., poured from metal made in this furnace will be exhibited. All of this material is being manufactured on a commercial scale by the Sweetser Bainbridge Metal Alloys Corp., which has several Ludlum electric furnaces in operation. Large photographs of this furnace also will be shown, together with analyses of these various products; represented by Thornton W. Price, G. E. Munro and O. D. Conover.

LUPTON'S, DAVID, SONS CO., Philadelphia.—Models of the rolled steel products for light and ventilation manufactured by this company, will be shown and detailed drawings as well as photographs of installations will be on display; represented by Clarke P. Pond, C. F. P. Buckwalter and H. R. Wilkinson.

LYND-FARQUHAR CO., Boston.—A 26-inch combined open side crank planer and shaper will be exhibited in operation. This is a new combination machine embodying all of the features of a planer with the quick motion of the shaper. In addition, a Lees-Bradner gear generating machine and a thread milling machine will be exhibited in operation; represented by Ralph Streeter, Howard L. Rich, John S. Alcorn and E. A. Bayden.

J. A. MACLEOD CO., Cincinnati. — This company will exhibit sand-blast tumbling barrels, sand-blast hose machine, portable oil burners, dust arrestors and oxy-acetylene welding and cutting apparatus.

MAHR MFG. CO., Minneapolis.—Foundry torches for cupola lighting, mold drying, preheating, etc., will be shown, as well as melting, rivet and forging furnaces; represented by J. A. Mueller, J. R. Matthews, R. B. Ecker, J. A. Mahr and H. H. Warner.

MALLEABLE IRON FITTINGS CO., Branford, Conn.—The complete line of vibrators, sizes ⅜ to 2 inches, inclusive, mounted for demonstration purposes will be shown, as well as the complete line of vibrator accessories made by this company, including knee valves, blow guns, starting valves, hose clamps, etc.; represented by G. B. Pickop and J. C. Page.

McCORMICK, J. S., CO., Pittsburgh.—A complete line of foundry supplies and facings will be shown as well as large cores coated with the blacking manufactured by this company; represented by J. S. McCormick, T. E. Malone, S. R. Costley and A. T. Richardson.

McCROSKY REAMER CO., Meadville, Pa.—A complete line of adjustable reamers, quick-change chucks and collets for drilling, tapping, stud-setting, etc., will be exhibited as well as turret tool posts for lathes, tap and die holders for turret lathes, universal lamp brackets and other time-saving devices for the machine shop; represented by C. M. Sutton and Clyde Derby.

McLAIN'S SYSTEM, INC., Milwaukee.—Samples of semi-steel castings of light section, such as automobile cylinders, pistons and other castings containing from 20 to 50 per cent steel, made by McLain graduates, will be displayed. Open-hearth steel castings poured from metal made in a McLain-Carter oil-fired furnace, also will be shown; represented by David McLain, I. V. Scanlan and Carl Huebl.

MICHIGAN SMELTING & REFINING Co., Detroit.—Ingot brass, bronze, tin and lead products including lead pipe, solders, babbitt and type metals will be displayed; represented by Joseph Stillman, Henry Levitt, Wm. J. Schweitzer, James Tiernan, E. E. Berliner, H. D. LeBel, R. H. Evans, R. R. Arnold and R. E. Moore.

MIDLAND MACHINE CO., Detroit.—All of the molding machines to be shown by this company will be operated and will include a small jar-ramming roll-over machine; hand-rammed roll-over machine and a small jar-ramming roll-over machine for making cores, designed for light operation by women in the core room if necessary. Motion pictures of the machines in operation in various plants will form a feature of this exhibit; represented by Geo. L. Grimes, L. V. Grimes, C. R. Jones and Oswald Carliss.

MOLTRUP STEEL PRODUCTS CO., Beaver Falls, Pa.—An extensive display will be made of flattened steel pattern plates, core plates, finished machine keys, finished machine rack and cold drawn steel bars; represented by N. S. Leyda and F. H. Guppy.

MONARCH ENGINEERING & MFG. CO., Baltimore, Md.—Types of the various line of foundry equipment, manufactured by this company will be exhibited, including several core ovens, showing the application of gas, oil, coal and coke as fuel and each oven will be of a different type designed to meet the requirements of various foundry conditions. Several crucible furnaces, designed for the use of gas, oil, coal and coke as fuel for the melting of non-ferrous metals, single and double chamber furnaces for melting metals without the aid of a crucible, oil and gas-fired annealing, tempering and hardening furnaces and in addition several auxiliary units which enter into general foundry equipment will be shown; represented by H. D. Harvey, James J. Allen, H. W. Raber, M. W. Woodburn and Frank Maujean.

MOTT SAND-BLAST MFG. CO., INC., Brooklyn, N. Y.—An operating exhibit consisting of a sand-blast tumbling barrel, hose-type machine, cabinet, exhausters, accessories, etc., will be made; represented by Davis Mayer, Louis Schroeder, C. B. Schneible, E. J. Rosenthal, Foster J. Hull, and E. C. Gilmour.

MUMFORD, E. H., CO., Elizabeth, N. J.—Samples of the line of molding machines manufactured by this company will be displayed; represented by T. J. Mumford, H. W. Sinclair and J. A. Walsh.

MUMFORD MOLDING MACHINE CO., Chicago.—Several of the different types of molding machines built by this company will be displayed and, in addition, enlarged cross-sectional drawings of the company's latest design of molding machine will be shown; represented by Donald Alexander, Otto F. Weiss, James T. Lee and W. H. Huelster.

NATIONAL ENGINEERING CO., Chicago.—An intensive sand mixer for foundry use will be shown in operation and literature will be distributed, describing a continuous core reducer and a screen separator; represented by H. S. Simpson.

NEW CHICAGO CRUCIBLE CO., Chicago.—Crucibles manufactured by this company for use in brass foundries will be exhibited.

NEW ENGLAND COAL & COKE CO., Boston.—A model of Bunker Hill monument will be reproduced from by-product coke. This replica will have a height of 45 feet, the base of which will be decorated with statuary and potted plants. Festoons of colored electric lights will be strung from the peak of the monument to each of the four standard-bearers on the four corners. Four statues, about 8 feet high, will surround the monument showing typical New England Puritans in the costumes of their time; represented by W. J. Lavelle, F. C. Knight, J. M. Dunbar and J. M. Taylor.

NEW HAVEN SAND-BLAST CO., New Haven, Conn.—A sand-blast rolling barrel and a medium size hose-type, sand-blast machine will be exhibited, as well as chilled shot, diamond grit, etc.; represented by C. A. Dreisback, C. E. Billings and C. S. Johnson.

NICHOLLS, WM. H., CO., INC., Brooklyn, N. Y.—Two combination jolt-ramming and power squeezers with automatic gravity drawing device will be exhibited, in addition to a plain power molding machine, a plain combination jolt-ramming and power molding machine and a combination jolt-ramming and power molding machine with roll-over device; represented by Wm. H. Nicholls.

NORMA COMPANY OF AMERICA, New York.—Ball bearings, roller bearings, precision testing instruments, etc., will be displayed; represented by E. A. Perkins.

NORTON CO., Worcester, Mass. — Four grinding machines will be shown in operation and these will be of the bench and floor types usually employed in foundries and provided with protection hoods. Grinding wheels used in foundry work also will be displayed; represented by George C. Montague, W. G. Snow, Herbert Duckworth and Wallace T. Montague.

OBERMAYER, S., CO., Chicago.—A full line of tumbling barrels, brass furnaces and other equipment and supplies for iron and brass foundries will be shown; represented by S. T. Johnsoa, E. D. Frohman, William Fenton, Wm. Fitzpatrick Sr., Wm. Fitzpatrick Jr., J. J. McDevitt, O. J. Peterson and George Deyette.

O. K. CRUCIBLE CO., New York.—Crucibles made by this company for use in foundries will be exhibited.

OLIVER MACHINERY CO., Grand Rapids, Mich.—A 16-inch tool room engine lathe will be exhibited in operation and in addition photographs will be shown of the complete line of pattern shop machinery and the universal wood milling machine built by this company; represented by J. W. Oliver, A. Blake, G. W. Crosley, A. S. Kurkjian and J. R. Duthie.

OSBORN MFG. CO., Cleveland.—The complete line of hand and power-operated molding machines manufactured by this company will be displayed; represented by H. R. Atwater, E. T. Doddridge, E. W. Jacobi, J. C. Alberts and E. J. Byerlein.

OXWELD ACETYLENE CO., Newark, N. J.—A complete line of oxweld equipment, part of which will be shown in operation, will be on display. This will include oxweld equipment of a low pressure type, an acetylene generating unit, and oxweld portable pressure generator in operation and welding and cutting blow pipes in representative applications, as made by oxweld users in New England and vicinity.

PANGBORN CORPORATION, Hagerstown, Md.—Photographs of various models and types of sand-blast and allied equipment, as well as samples of work done by these ma-

chines will be displayed in the booths fitted up by this company as a rest and reception room where telephone and stenographic service will be provided; represented by Thomas W. Pangborn, John C. Pangborn, W. C. Lytle, P. J. Potter, George A. Cooley, Alfred L. Holmes and C. M. Goldman.

PAXSON, J. W., CO., Philadelphia.—An extensive line of foundry equipment and supplies will be exhibited, including sands, facings, sand-blast machinery, etc. Photographs and blue prints also will be displayed showing the various lines of foundry equipment built by this company; represented by H. M. Bougher, W. S. Thomas, R. H. Rehm, E. M. Taggart, A. G. Warren and I. F. Kremer.

PICKANDS, BROWN & CO., Chicago.—A patriotically-trimmed display of Solvay coke in the form of a wheel hub with gilded wooden spokes wil be made; represented by Geo. A. T. Long, Thos. W. Glasscot, Bayard T. Bacon, Jas. A. Galligan, Jas. A. Ballard and Wm. H. Ball.

PITTSBURGH CRUSHED STEEL CO., Pittsburgh.—Samples of all sizes of angular grit used for sand-blast purposes will be exhibited; represented by G. H. Kann.

PORTAGE SILICA CO., Youngstown, O.—Samples of the silica sand, gravel and sand-blast sand, mined and prepared by this company, will be displayed, as well as the original rock from which this material is obtained. Photographs of this company's extensive plant also will be shown; represented by E. E. Klooz and L. R. Farrell.

PRIDMORE, HENRY E., INC., Chicago.—The regular line of molding machines manufactured by this company will be shown and several new features will be introduced; represented by Charles H. Ellis, D. F. Eagan, A. V. Magnuson and J. W. Dopp.

QUIGLEY FURNACE SPECIALTIES CO., New York City.—A binding material used for furnace linings will be displayed.

RICHEY, BROWNE & DONALD, Maspeth, N. Y.—Roller-ramming molding machines and sand handling appliances will be exhibited; represented by Walter Hofmann and Joseph B. Donahue.

RIVETT LATHE & GRINDER CO., Boston.—A back-geared precision bench lathe mounted on a cabinet with individual motor drive and attachments will be exhibited, together with two sizes of internal grinders complete with standard equipment. An improved threading tool also will be displayed; represented by Cecil Ogden, A. O. Richter, Fred Lord and F. H. Halstead.

ROBESON PROCESS CO., New York.—Cores made with glutrin and samples of that material will be shown, as well as some interesting photographs. The booth will be fitted up as a reception room and a useful souvenir will be distributed; represented by Geo. N. Moore, T. J. Ryan and R. S. Hughes.

ROGERS, BROWN & CO., Cincinnati.—An extensive display will be made of samples of pig iron representative of practically every grade manufactured by blast furnaces in the United States. Bee-hive and by-product cokes also will be shown, as well as an extensive assortment of ferro-alloys. Gray iron, semisteel and malleable iron castings, both ornamental and practical will be exhibited; represented by A. A. Fowler, W. T. Shepard, E. L. Billingslea, Geo. R. Sullivan, Richard Peters Jr., R. W. Clark, Otto Arlt, J. A. Claussen, Sterling W. Hubbard, Thos. E. Wilson, F. J. Waldo, A. T. Stengel, J. C. Mears, H. W. Fernald, F. E. Fitts, W. R. Maher, E. F. Bowden, F. W. Miller and F. W. Bauer.

SAFETY FIRST SHOE CO., Providence, R. I.—Shoes designed for foundrymen and others who handle hot metal will be shown by this company.

SAND MIXING MACHINE CO., New York.—This exhibit will consist of a sand cutting machine; rotary table sand-blast room; humane sand-blast rotary table in which the operator stands outside and is immune from dust; large sand-blast tumbling barrel and a new type of humane sand-blast room for handling all kinds of small work; represented by V. E. Minich, H. L. Wadsworth, Hutton H. Haley, J. D. Alexander and Charles G. Smith.

SHEPARD ELECTRIC CRANE & HOIST CO., Montour Falls, N. Y.—Standard hoists built by this company will be displayed, including a foundry hoist, having variable speed control; a new light load capacity hoist, designed to take care of loads slightly too heavy for one man to handle; an electric hoist which is portable and applicable to cranes and derricks, and an enclosed electric winch, which operates in oil. In addition to the foregoing, a section of monorail track and T-bar conductor with insulators and accessories will be displayed. A set of enlarged photographs showing the entire Shepard line will be included in this exhibit; represented by F. A. Hatch, A. J. Barnes, R. H. McGredy, W. A. Battey, W. C. Briggs, W. B. Martwick, N. P. Farrar and H. W. Gledhill.

SIMONDS MFG. CO., Fitchburg, Mass.—Saws for cutting metals will be shown.

SLY, W. W., MFG. CO., Cleveland.—An extensive display of equipment for cleaning castings will be made, including a 10 x 10-foot sand-blast room, horizontal sand-blast barrel, sand-blast pressure tank and a sand-blast mill with dust arrester. In addition, a rosin mill and a two-section drawer type core oven will be displayed; represented by W. C. Sly, Geo. J. Fanner, P. W. Graue and H. P. Furlong.

SMITH, R. P., & SONS CO., Chicago.—Safety shoes for molders and foundrymen will be displayed; represented by J. B. Smith Jr.

SMITH, WERNER G., Co., Cleveland.—Core oils, cores made from these oils and castings in which cores have been used made from these core oils, will be displayed. In addition an extensive exhibit will be made of different grades of plumbago facings; represented by Werner G. Smith, Frank H. Dodge, Milton S. Finley, Albert L. Fay, L. P. Robinson, W. E. Rayel and Louis F. Ferster.

STANDARD EQUIPMENT CO., New Haven, Conn.—A water cinder mill will be shown in operation; represented by Chas. A. Dreisbach and Louis Bradley.

STERLING WHEELBARROW CO., West Allis, Wis.—In addition to having its booth fitted up as a rest-room for the convenience of visiting foundrymen, it will exhibit its line of steel flasks, foundry wheelbarrows and foundry specialties such as wedges, skim gates, etc.; represented by I. R. Smith, H. H. Baker, J. M. Dickson, Geo. H. Lambkin, Edw. Dowd, J. W. Dopp, J. J. Coyne and Chas. L. Kirk.

W. F. STODDARD, Syracuse, N. Y.

STRONG-KENNARD & NUTT CO., Cleveland.—A general line of safety devices will be shown, including goggles fitted with non-splintering glass, respirators, leather asbestos leggings and gloves, safety signs, first aid cabinets, hospital furnishings and equipments, fire extinguishers, sand-blast, dust helmets and many other safety supplies. The non-splintering glass used in the goggles is made by putting together two pieces of glass and welding them with material similar to celluloid. In appearance, the lenses are the same as the ordinary goggle lenses, but the advantage of their use is, that even though cracked, they will not splinter owing to the interlining which holds all the chips; represented by Buell W. Nutt and Walter Marken.

SULLIVAN MACHINERY CO., Chicago.—An angle-compound compressor, 14 x 8¾ x 10 inches, equipped with improved plate valves throughout will be installed, which will supply air for the operating exhibits in the foundry machinery and machine tool sections. This machine will be driven by a 75-horsepower General Electric motor. Its capacity at 250 revolutions per minute is 445 cubic feet of free air against a terminal pressure of 100 pounds per square inch. In addition, plate valves of the end-rolling finger pattern will be shown. An 8 x 8-inch, belt-driven, single stage compressor, of the splash-oiled, totally-enclosed type will be exhibited in addition to air lift pumps and an air booster for securing water supply from wells. A photographic exhibit also will be made of other classes of Sullivan air compressors; represented by G. E. Wolcott, H. C. O'Brien, G. H. Richey and Alexander Milne.

THOMAS IRON CO., Boston.—Samples of the various grades of pig iron manufactured by this company will be shown.

TITANIUM ALLOY MFG. CO., Niagara Falls, N. Y.—Ferro-carbon-titanium manufactured by this company will be exhibited and in addition there will be held a display of castings manufactured by the Titanium Bronze Co., of Niagara Falls, allied with the parent company. The Titanium Alloy Mfg. Co. will be represented by G. A. White, Wm. J. Evans and Wm. V. Knowles. The Titanium Bronze Co. will be represented by H. R. Corse and A. C. Olfs.

UNITED COMPOUND CO., Buffalo.—Wax wire for venting cores and wax for use on patterns will be displayed; represented by John W. Bradley and L. F. Leney.

UNITED METAL HOSE CO., New York City.—Flexible metal hose of various types will be exhibited, including armored metal, lined, welding, air, pneumatic tool, metal armored sand-blast, metal hose for steam, and metal-lined hose for oil; represented by Joseph M. Lewin.

UNITED STATES GRAPHITE CO., Saginaw, Mich.—Samples of graphite foundry facings will be displayed; represented by A. W. Walker, J. G. Drought, R. A. Corrigan, F. B. Godard and H. F. Gump.

U. S. MOLDING MACHINE CO., Cleveland.—Six different types of molding machines, manufactured by this company will be shown in operation, including a plain air squeezer, combination jar-ramming and squeezer molding machine, combination jar-ramming, squeezer and pattern-drawing machine, combination jar-ramming and pattern-drawing machine, combination jar-ramming roll-over and pattern-drawing machine and a plain air-operated jar-ramming machine; represented by J. N., C. F. and J. L. Battenfeld.

UNITED STATES SILICA CO., Chicago.—Samples of the flint shot made by this company will be exhibited. Photographs of plants where this material is produced as well as photographs of customers' plants and product will be shown in addition to the photograph of this company's new plant; represented by A. Volney Foster, Lewis B. Reed, Harry F. Goebig, and Oliver Cook.

WALLACE, J. D., & CO., Chicago.—A bench planer will be shown in operation, equipped with a special flap and shutter safety guard; represented by J. D. Wallace.

WARNER & SWASEY CO., Cleveland.—The machine tool exhibit that will be made by this company will consist of a universal hollow hexagon turret lathe, operating on bar work; a universal turret screw machine, operating on bar work and a plain head turret screw machine. All of this equipment will be

(*Concluded on Page 601*)

Fig. 1—Plant of Columbia Steel Co., Showing Main Foundry Building, Office, Laboratory, Power House and Pattern Storage

Steel Foundry on the Pacific Coast

Description of the Plant of Columbia Steel Co. at Pittsburg, Near San Francisco, California—Both Basic and Acid Open-Hearth Castings Are Produced—Large Variety of Work Turned Out

STUDENTS of iron and steel trade conditions are thoroughly familiar with the remarkable growth of the steel casting business in the industrial centers of the north and east during the past few years. That there has been equivalent expansion in the outlying sections of the country is not so generally appreciated. Both in the south and west, however, the steel foundry business is moving forward rapidly and on the Pacific coast in particular unusual progress has been made. The situation in the far west is specially interesting on account of peculiar local conditions.

To operate a steel foundry successfully on the Pacific coast, numerous difficulties, not found in other sections of the country, must be surmounted. The usual raw materials are costly and in some cases difficult to obtain at any price. For the converter process, low phosphorus pig iron must be hauled across the country from Pennsylvania. Thousands of square miles are combed for scrap and there are no recognized agencies for collecting and grading old material as in the east. Nor is it easy to obtain the proper grades of sand. Customers are widely scattered and their demands so variable that operating on an ordinary manufacturing basis is next to impossible.

Progress, therefore, has been made in the face of unusual obstacles and the success that has been achieved is a tribute to the genius and perseverance of the leading factors in the trade rather than to any special improvement in natural conditions. In fact today, owing to restricted supplies of raw material, the problems of the Pacific coast steel foundryman are multiplied, and any new concern entering the field at this time would of necessity face the usual period of experimentation and uncertainty as to the final outcome.

Among the few companies that have won their way through to success in the steel casting business in the far west, one, the Columbia Steel Co., has achieved an outstanding position. This concern now operates two plants, one at Pittsburg, Cal., near San Francisco and the other at Portland, Oreg. The general offices are at 503 Market street, San Francisco. The company's output is in the neighborhood of 900 tons a month, the greater portion of which is produced at the California plant.

The California plant was built in 1909-10 and the Portland plant in 1903. The present company was organized in 1909 with San Francisco capital, as the successor to an Oregon corporation. The company owes its name to the Columbia river which divides Washington and Oregon. Pittsburg, Cal., at which the larger of the company's two plants is located, is in Contra Costa county, about 40 miles northeast of San Francisco. The company's property at this point covers about 25 acres, the greater portion of which is occupied. Pittsburg is on New York slough, which is one of the outlets of the San Joaquin river. Deep water from San Francisco bay extends up to the company's property and the plant site borders on the slough, making it possible to handle incoming and outgoing shipments by water, including seagoing consignments.

At the present time the Pittsburg plant employs about 375 men; the output is approximately 800 tons of basic and acid open-hearth castings per month.

The company's product is shipped to all of the larger consumers of steel castings throughout the Pacific coast. The sales territory extends from southeastern Alaska on the north to the Mexican line on the south and from eastern Nevada and western Montana on the east to Hawaii on the west. The management of the company believes that local manufacturing establishments should be encouraged. To this end equipment has been installed in the Pittsburg and Portland plants which, it is believed, adequately serves the steel casting needs of the entire Pacific coast. A substantial proportion of the company's output is absorbed by the shipbuilding industries of the Pacific coast. Gold dredging companies, railroads, lumber companies, logging concerns, mines, and tractor manufacturing concerns also are numbered among the customers of the Columbia Steel Co. An unusual variety of work, therefore, is manufactured, including

A CONFERENCE
From left to right, A. M. Clark, manager, Portland works; C. M. Miall, general manager, and D. H. Botchford, manager, Pittsburg works

basic open-hearth castings which are made at the California plant, and converter castings, produced at the Portland works. In addition to ordinary carbon steel castings, the common varieties of alloy steels are produced, including chrome-steel, chrome-nickel steel, nickel-steel and manganese-steel castings. The necessary ferro alloys, such as ferro-manganese, ferrochrome, ferrosilicon, etc., are obtained from locally operated electric smelters.

The Pittsburg plant was designed by S. T. Wellman, iron and steel works engineer, Cleveland. The buildings are of fireproof material, the main foundry buildings being of steel construction, and the subsidiary buildings of brick. The main building is 480 feet long and 60 feet wide. Adjacent to it is a secondary building for light molding 360 feet long and 40 feet wide.

Hoisting Equipment

The main bay is served by three electric traveling cranes of 40, 30 and 20 tons capacity, respectively. An additional 40-ton crane has been ordered. The light molding floor is served by two 5-ton cranes, one of which is shown in Fig. 5. All of the cranes are operated by alternating current motors. This is contrary to the usual practice in eastern foundries where direct current motors generally are employed. The operation of the alternating current motors is said to be entirely satisfactory.

The plant is served by two industrial tracks connecting with the Southern Pacific and the Santa Fe railroads. Most of the incoming and outgoing materials are handled over these tracks. Steel scrap constitutes the principal incoming raw material. On account of local conditions, a very large proportion of scrap and comparatively little pig iron is used in the furnace mixtures. As previously mentioned, scrap is gathered from all points of the compass and it is not possible to purchase it in a properly cut and graded condition as it is in the east. Equipment, therefore has been provided at the Pittsburg plant for working up scrap, including the necessary shears, a skull cracker, etc. Ample yard space also has been set aside for the storage of raw and prepared scrap. Owing to its isolated location, the company has found it necessary to keep a supply of raw material on hand sufficient to cover its requirements for approximately a year. A locomotive crane is used for handling scrap and other raw materials in the yard. The charging boxes are filled in the yard and hauled up to the charging floor by means of a cable gear. A magnet also is employed for handling scrap.

The company finds it necessary to carry a large number of patterns in stock for the benefit of its customers. For this purpose, a semi-fireproof pattern storage building, shown at the extreme right in Fig. 1 has been provided. This structure is 75 feet wide, 180 feet long and 3½ stories in height. The larger and heavier patterns are stored on the ground floor and the lighter patterns in racks on the upper floors. The various bins and shelves are properly numbered and an index is maintained so any pattern may be instantly located.

A completely equipped pattern shop, for making both wood and metal patterns, also is provided. For constructing wood patterns, California redwood is very largely employed.

FIG. 2—POURING SIDE OF OPEN-HEARTH FURNACES, SHOWING ARRANGEMENT OF SPOUTS, LADLE PITS, REGENERATORS, ETC.

Molding Practice

Owing to the great variety of work turned out, it has not been possible to standardize the molding practice to any extent. Most of the molds are made by hand, cast-steel flasks being employed. Heavy molds are rammed on a jarring machine with a 6-foot table furnished by the Herman Pneumatic Machine Co., Pittsburgh. Eight squeezer machines of a standard type also have been installed. The molding sand, most of which is obtained locally, is prepared for use in two mixers of the Simpson type, manufactured by the National Engineering Co., Chicago. For handling

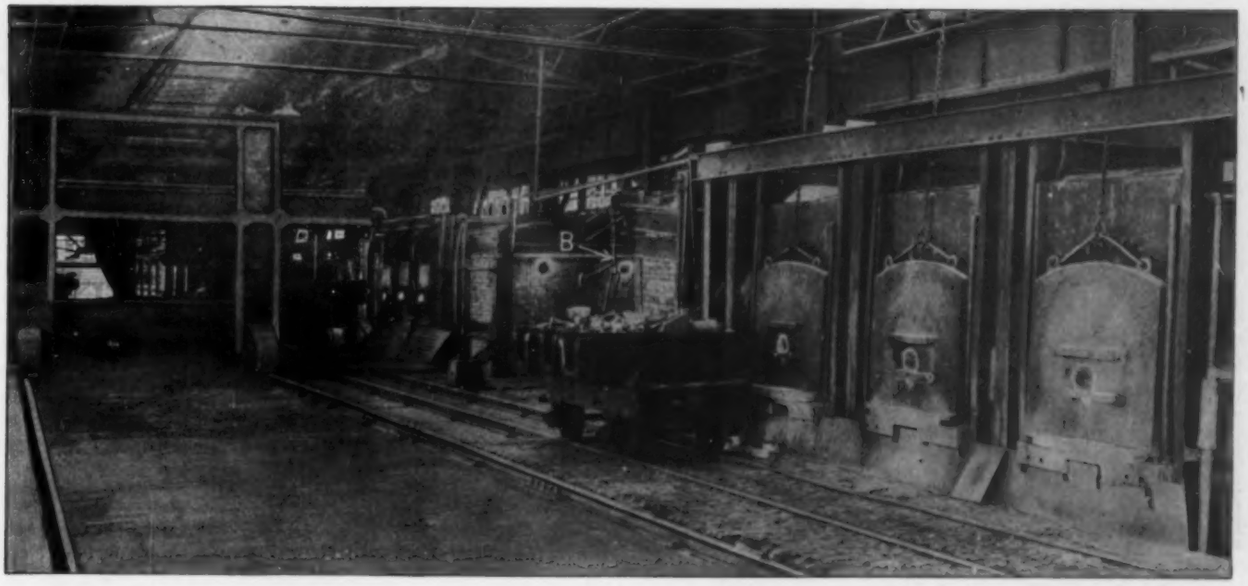


FIG. 3—CHARGING SIDE OF OPEN-HEARTH FURNACES, WITH CHARGING MACHINES IN BACKGROUND

molds over the jar ramming machines, and at other points where special tackle is necessary, jib cranes have been provided equipped with Ingersoll-Rand or Curtis pneumatic hoists.

For carrying the sand from the mixing machines to the molding floors, special wooden boxes have been designed. They are provided with bails which permit them to be handled by the traveling cranes, and are about 5 feet wide, 8 feet long and 4 feet deep. One end of the box swings on hinges so that when it is unlatched the contents are easily discharged. For cleaning up the floors after the heats are poured as well as for handling sand, a single-line grab bucket built by Pawling & Harnischfeger Co., Milwaukee, has been provided. This bucket, which is of standard design, is operated by the traveling cranes. These are two concrete-lined pits about 18 feet deep for putting up large molds. These pits are conveniently located in front of the open-hearth furnaces.

Most of the molds are dried and for this purpose three oil fired mold-drying ovens have been provided. The ovens are equipped with cars for conveniently handling the molds. Most of the small castings, which are made of acid steel, are poured in green-sand molds. A large amount of the work is annealed and for this purpose two annealing ovens have been provided. A view of one of the molding floors, which indicates clearly the general arrangement of the shop, is shown in Fig. 5.

The melting equipment includes two open-hearth furnaces shown in Figs. 2 and 3. The larger furnace, which is provided with a basic lining, was designed originally as a 15-ton furnace, but up to 30-ton heats have been taken off. The smaller furnace, which is acid lined, has an 8-ton hearth. It is used, however, exclusively for small heats, from four to five tons usually being taken off. Smaller heats are charged so that the metal will not turn

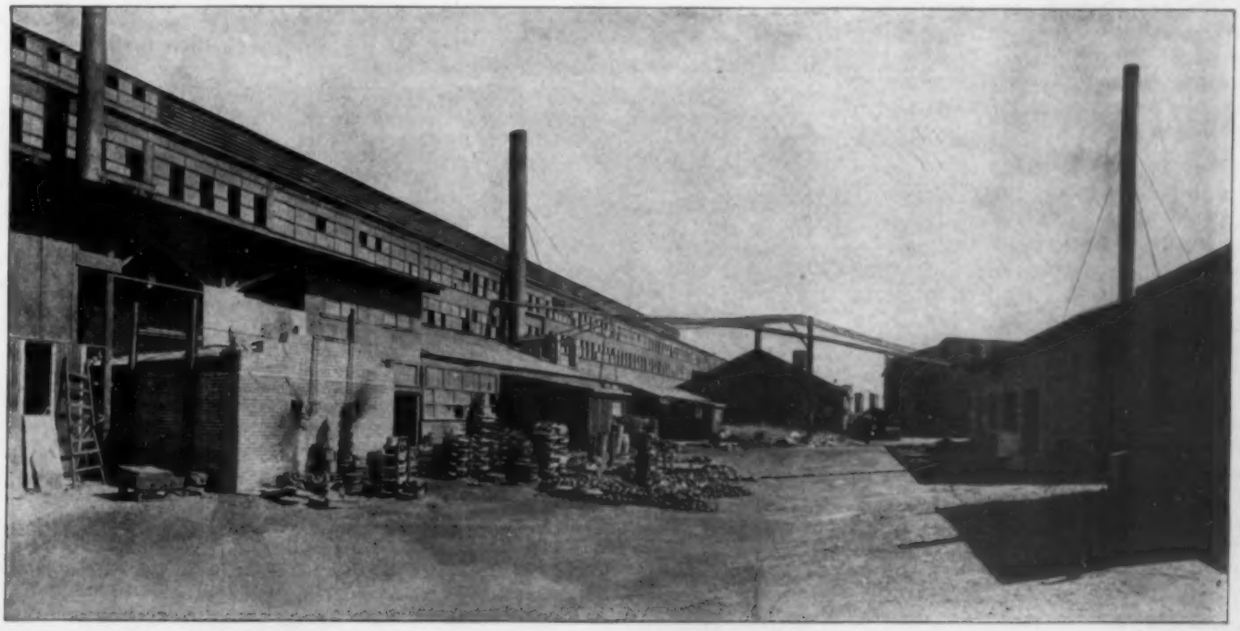


FIG. 4—THE FOUNDRY YARD WITH THE MAIN BUILDING ON THE LEFT AND AUXILIARY STRUCTURES ON THE RIGHT—A GROUP OF FINISHED CASTINGS IS SHOWN IN THE FOREGROUND

FIG. 5—ONE OF THE MOLDING BAYS DEVOTED TO LIGHT WORK

cold while pouring. Both furnaces are of stationary type and their general construction presents no unusual features.

Oil fuel is used and the piping is arranged so that the oil may be atomized either by steam or air. Normally steam is employed. The burners are inserted in holes pierced through the end walls of the furnaces in the usual manner. A trolley gear is used to withdraw the burner from the furnace when it is not in use. Each furnace, of course, is provided with two burners, one at each end, and they are used alternately as the furnace is reversed. The general arrangement of the burner mechanism of the acid furnace is shown at *B*, Fig. 3.

The two furnaces are served by a Wellman-Seaver-Morgan charging machine of standard type. This machine, together with the general arrangement of the charging platform is shown clearly in Fig. 3.

Local Magnesite is Used

Ordinarily, the basic furnace is operated on a schedule of three heats a day and it is not difficult to turn out 20 heats in a week of six days. Normally, the plant is not run on Sundays. California magnesite, which is now being used extensively in the east owing to the cessation of imports from Austria and Greece, is employed for lining the basic furnace. Local limestone also is available in large quantities. Where it is necessary to use iron ore in the furnace charge, California magnetite, running 70 per cent iron is employed. There are large quantities of iron ore in the west and a small tonnage is now available for steel foundry use. The operations are so conducted that the roof of the basic furnace yields from 300 to 400 heats before extensive renewals are required. This practice compares favorably with that of the best eastern foundries using oil fuel.

The pouring side of the open hearth furnace is shown in Fig. 2 and the furnace spouts, as this illustration indicates, are handled by specially arranged jib cranes equipped with pneumatic hoists. Suitable ladle pits are provided in front of the furnaces for accommodating the ladles when heats are tapped out.

Oil for the furnaces, ovens, boilers, etc., is supplied by the Standard Oil Co. of California through its river delivery service from a station a few miles away. The oil is pumped into two large storage tanks. Oil receiving lines extend down to the company's dock on the water front.

The core room is situated in a building adjoining the main foundry building. It is completely equipped with modern core-making devices, including machines for turning out standard round and square cores, etc. This department is somewhat congested at present and in order to relieve this, the company expects to add 140 feet to the building. A portion of the extension will be devoted to cleaning small castings. For drying the cores, two combined car and shelf type ovens have been provided. The ovens are fired with oil and the shelves for drying the small cores are located on both sides, leaving the center space entirely free to receive the car.

Cleaning Room Equipment

Both large and small castings are now cleaned at one end of the main foundry. Later special facilities will be provided for cleaning the small castings as previously mentioned. The cleaning room equipment includes four swing grinders and four stationary grinders with an ample supply of chipping hammers. Both electric arc and oxy-acetylene welding apparatus are provided. The shrink heads, risers, etc., are cut off with oxy-acetylene torches.

Electric power for motors and lights is supplied by the Pacific Gas & Electric Co. through connections to two separate trunk lines, either of which may be utilized in case of emergency. The Great Western Power Co. also has transmission lines running by the plant. In addition, a gas plant adjoins the company's property.

A new brick power house has recently been constructed. It is equipped with an oil-fired, return-tubular boiler that supplies steam for atomizing the oil burners throughout the plant, together with two Ingersoll-Rand two-stage air

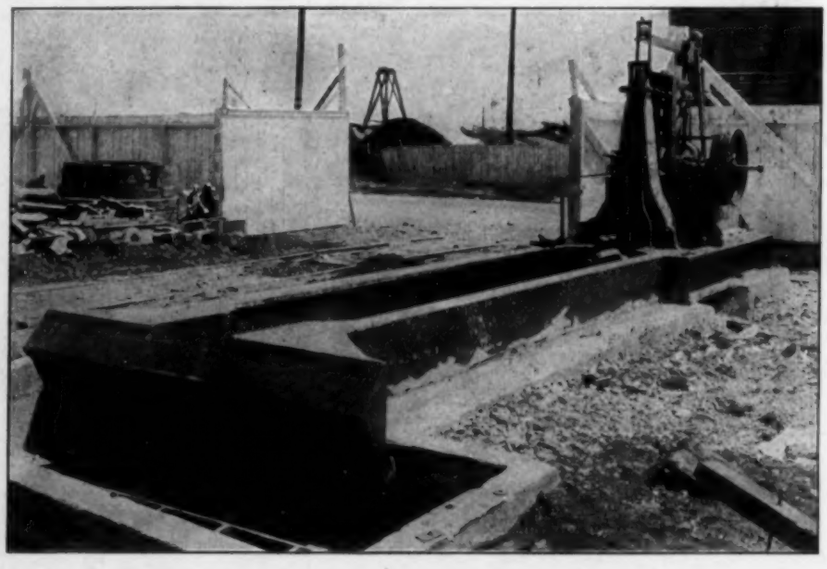


FIG. 6—SPECIAL MACHINE FOR TESTING ANCHORS

compressors. Each compressor is belted to a 75-horsepower 440-volt alternating current Fairbanks-Morse motor. The third compressor is about to be installed in order to increase the volume of compressed air available. Air outlets are provided at convenient points throughout the shop and a large number of pneumatic devices are utilized in the molding departments.

The company operates a completely equipped chemical and physical testing laboratory. The physical testing equipment includes a Riehle tensile test machine and an Olsen anchor testing machine. The latter, which has a capacity of 400,000 pounds, is one of the few machines of its kind in the country.

The company has given special attention to the comfort, welfare and safety of its employes. All of the equipment is regularly inspected from a safety standpoint. Particular attention is given to crane cables which are renewed every six weeks or two months. Chain slings are frequently annealed.

The Columbia Steel Co. also believes in keeping its working force constantly in personal touch with its customers. The foundry foreman, and even the order clerks, make occasional trips for the purpose of meeting customers and becoming personally acquainted with their needs. This policy has created a personal contact with the trade which has had very beneficial results.

The Portland, Oreg., plant is equipped for the manufacture of converter steel exclusively. The equipment includes two cupolas, one 2-ton side blow converter, annealing furnaces, machine shop, etc. The annual capacity of this plant is approximately 2400 tons. On account of its northwestern location, it is in a position to make early delivery to customers in the Puget Sound and Columbia river districts, thus obviating the delay which would be incurred by making shipment from the plant at Pittsburg. Important additions and improvements are now being made at the Portland plant. All of the manganese-steel castings manufactured by the Columbia Steel Co. are produced at the Portland works.

What You Will See at Boston Show

(*Continued from page* 596)

motor-driven; represented by A. C. Cook and H. L. Kinsley.

WHEELER & HOLCOMB CO., Chicago.—A display will be made of "safety first" wearing apparel, including gloves and mittens made from asbestos cloth and leather. Leggings will be shown made of asbestos cloth, fireproofed duck cloth and chrome leather. In addition, aprons will be shown, made of asbestos cloth and fireproofed duck, as well as spats, short leggins, hip leggins, suits, hand leathers and other apparel for protecting foundry and steel works operators; represented by F. H. Wheeler and Charles A. Kingsbury.

WHITE & BRO., INC., Philadelphia.—Ingot metals of all kinds will be shown including the company's two brands of copper ingots, as well as castings made from these ingots; represented by Frank Krug.

WHITEHEAD BROTHERS CO., Providence, R. I.—The booth to be occupied by this company will be fitted up as an office and rest room for the reception of friends of this concern; represented by A. J. Miller, J. H. Whitehead, V. L. Whitehead and Charles E. Andrews.

WHITING FOUNDRY EQUIPMENT CO., Harvey, Ill.—The foundry equipment that will be displayed includes a 10-ton crane trolley, a teapot spout ladle and a round plate barrel tumbler. In addition, photographs and drawings of the extensive line of foundry machinery manufactured by this company will be exhibited; represented by R. H. Bourne and C. A. Hardy.

WOODISON, E. J., CO., Detroit.—An extensive display of foundry equipment and supplies will be made, including an electrically-operated jolt-ramming roll-over molding machine, wood grinder, core oils, buffing compositions, etc.; represented by E. J. Woodison, D. H. Woodison, G. A. Burman, U. W. Frink, W. J. Wark, W. M. Maybank, W. Renchie, D. D. Baxter, H. T. Taylor, C. G. Howe, G. Brady and C. J. Skeffington.

WOOD'S, T. B., SONS CO., Chambersburg, Pa.—Tapered snap flasks and automatic adjustable snap jackets will be exhibited as well as flasks in various sizes fitted with pin equipment, designed for the different methods of snap molding. Jackets in corresponding sizes also will be displayed adapted for a wide range of snap flask work; represented by Chas. M. Wood, Geo. M. Naylor and Victor Lesher.

Social Insurance

A most comprehensive discussion of practically all phases of social insurance, including workmen's compensation, sickness (health) benefits and insurance, invalidity and old age insurance, pensions, and retirement allowances, maternity benefits and mothers' pensions, and unemployment and savings bank insurance, appears in Bulletin 212 recently issued by the bureau of labor statistics of the U. S. department of labor. It gives in full the proceedings of the conference on social insurance held in the city of Washington, Dec. 5 to 9, 1916. This conference was in pursuance of a resolution adopted by the International Association of Industrial Accident Boards and Commissions at its meeting in April, 1916, following which a committee on social insurance was appointed, with Dr. Royal Meeker, United States commissioner of labor statistics, as chairman. The purpose of the conference was to afford an opportunity for free and ample discussion by those familiar with the various phases of social insurance, in order to define clearly and state definitely for the information of legislators and administrators all the problems connected with securing adequate protection to workers against the hazards of accident, sickness, invalidity, old age, and unemployment.

Two days were devoted to a discussion of workmen's compensation. Papers on the merits and demerits of the different forms of administration are confined largely to a statement of particular systems, while those relating to the different methods of carrying workmen's compensation developed a number of conflicting opinions a discussion of which, it is hoped, will result in a selection of the method best adapted to conditions in the several states. The bulletin also contains papers treating the subjects of compensation schedules of awards, lump sum settlements, and the principles of rate making, in which the comparative advantages of schedule rating and experience rating for determining insurance premiums are set forth. Other papers emphasize the importance of accident prevention, compensation being at best but a poor substitute for prevention.

Some of the most interesting and profitable addresses of the conference dealt with the general subject of medical services and medical and hospital fees under workmen's compensation, and the physical examination and medical supervision of employes. In the general discussion which followed a sharp difference of opinion developed as to objects, methods, and results of physical examination and medical supervision. The fear was expressed by a number of labor men that compulsory physical examination might result in unfair discrimination against certain employes and might be used to the detriment of labor organization.

In considering the defects and suggested changes in workmen's compensation laws, emphasis was laid upon the omission of occupational diseases from most laws and the exclusion of large numbers of workers in agricultural employment and domestic service.

The papers and discussion on sickness benefits and insurance were devoted to a consideration of existing agencies, proposed legislation, special problems of sickness insurance for women, and medical benefits and services.

The advantages of compulsory and noncompulsory health, invalidity and old age insurance and pensions are brought out in several papers and the general discussion which followed their presentation. Other papers and discussions cover service pensions, pension funds, and trade-union benefit funds. Maternity benefits and mothers' pensions were also given considerable attention at the conference, and the subjects of unemployment and savings bank insurance were treated in papers on the British national system of unemployment insurance and the Massachusetts system of savings bank insurance.

Safeguarding Electrical Equipment

Constant Danger to Workmen Surrounds Electrical Equipment—Some of the More Serious Conditions, However, May Be Considerably Improved by the Installment of Economical Safety Devices

BY WALTER GREENWOOD

IN MAKING electrical installations, the problem of first importance, has been to make and operate them without endangering human life. It might be said that in the early days of employing electricity to any considerable extent in the operation of industries and utilities, its dangers were understood as also were the safeguarding methods that should be employed, but the necessity for rigid employment of the methods has been slow in receiving acknowledgement. To say the artisan of normal intelligence and ability is one of the worst obstructors of the work of promoting safety as it applies to installations and operations of equipment, is not the utterance of one who has failed to understand the limitations of applying theoretic principles, especially to situations where they will not fit. We are able to cite the process in evolution of many of the best safety appliances, from the first effort toward their introduction to their complete and successful development, where nothing but condemnation of them was offered by many who were in position to advance their success. Among the notable instances where the development and installation of safety appliances were retarded are automatic-couplers, air brakes, protectors for eyes, and automatic stops for prevention of over-travel or over-speeding.

A Few Vital Questions

Some of the problems that should receive the careful attention of electrical engines, are comprised in the following list:

1. The general principles that should govern the installation of automatic engine stops.
2. The general principles that should govern, for safety, in the construction of electric switches.
3. Should any low limit be fixed for voltage that is dangerous?
4. Should or should not fixed stops be placed on tracks of run-ways to prevent cranes passing a given point intermediate between the ends of the run-ways?
5. Should the hot metal hoist of a ladle crane be used for any other purpose than handling ladles?

The bursting of fly-wheels, generators and turbines is taking a large toll of human lives as well as causing destruction of property.

There are many kinds of automatic stops in use on engines, and some kind was found to be installed on nearly every engine where the turbine or fly-wheel bursted, during the period covered by the last 10 years or more. An engine stop should, if possible, be constructed so that with ordinary attention it will not fail to operate when required, regardless of the inconvenience it may cause by operating unexpectedly by reason of its own imperfections, or by failure of its operating agency.

We can cite five cases where turbines bursted and in two of these there was dreadful loss of life. In each of these cases the turbine was equipped with automatic controlling device that failed to prevent the explosion. There is no doubt but that a properly installed independent automatic stop, electrically operated, would have prevented each of these several explosions.

We cannot raise any objection against mechanically operated engine controllers, and admit they are wonderfully efficient, but they are constantly at work and history shows that they lay down on their jobs through fatigue, injury or other causes, usually unexplained or unexplainable. Then is the time a spell hand controller is useful. Such a controller as we have in mind cannot fail only through improper conditions and we are compelled to admit improper conditions can exist. It is admitted the mechanically operated control can fail, too, but if the chance for failure of each was one time in one month, the chance for both to fail during a simultaneous period of five minutes duration would be one time in 730 years.

We find that objections are taken by some to an electrically operated non-balanced valve, because, with disuse, corrosion occurs, or matter is deposited from the steam, which prevents closing of the valve. If this is a legitimate objection why should not objections on similar grounds condemn all manner of instruments employed in the industries? All need attention, or there would be but little employment for labor.

A reason for favoring an electrically operated unbalanced valve for stopping an engine, installed along with such other automatic device as may be desired, is that it can be operated from numerous points, and any remote point if desired. The energy for operating the valve, if the installation is properly made, is as reliable as the energy that must be depended on to operate any other kind of controlling device. Where these stops are used, an independent generating outfit, connected to a wet battery, should be installed in large plants. This would insure against failure of current, but to further insure against such failure, a switch should be supplied to automatically cut in current from some one of the most reliable circuits on the generating station, in case the independent generator failed or stopped. An emergency valve should never be placed with its stem on the under side. On all engines, with the possible exception of turbines, the cylinder oil should be fed in ahead of the emergency valve. Valves on turbines can be given sufficient lubricant to prevent corrosion or accumulation of matter around the stem, without any objection. The lubricant should be injected directly onto the valve stem in quantity so small it could have no noticeable effect on other parts of the turbine. Last but not least, in the list of requirements we have to suggest, the energy for operating the mechanism should be supplied through a closed circuit.

Automatic stops, electrically operated, are at present applied principally to prime movers that travel in but one direction. They can be applied just as well to reversing engines, such as are used in rolling mill work for breaking down ingots. The saving in wear and tear alone, justifies their installation on such engines.

Controlling Blast Engine Overhead

The matter of installing automatic stops on blast engines has never received much consideration, because the hazard of interrupting the flow of air through the blast pipes is much in excess of the hazard of wrecking the blast engine by overspeeding. However, there is a hazard from blast engines overspeeding, though it is more remote than with engines used for other purposes, and it could be reduced

A paper presented at the eleventh annual convention of the Association of Iron and Steel Electrical Engineers, Philadelphia, Sept. 10 to 14, 1917.

by installing unbalanced valves, kept open by magnet, but not automatically closed from overspreading, that could be operated by breaking the circuit from various remote points. The process of stopping an engine by closing the throttle is too slow even though an attendant is near enough at the critical time. While the ordinary governing control on a blast engine seems to be sufficient when we consider the liability of one of these engines being wrecked by over speeding, wrecks have occurred which the governor failed to prevent. For this reason, blast engines, too, should be equipped with electrically operated valves along with other speed control equipment, that could be made to check the speed of the engine without stopping it entirely.

Construction of Switches

The list of accidents directly chargeable to switches, that is, burns and shocks from contact with live parts is a long one. Accidents chargeable to unexpected closing of switches are of even more serious character. Contact with switches may result in burns or shocks, closing unexpectedly may result in running machinery over persons, crushing them between moving parts, entangling them in gears or belts, etc.

While we might consider that burns or shocks from direct contact with parts of a switch are not often serious, and could be avoided by using a reasonable degree of caution, the fact is they do occur, and most frequently with those who might and do know they should exercise caution. An ordinary burn of the flesh from a flash is seldom very serious, but some are received on the eyes and often result in total loss of sight, an affliction that ranks with the most deplorable that can result from accidents.

We must admit that a switch should be constructed so that extreme caution will not be required for avoidance of accidents of all kinds incidental to its use, if it can be done. We are sure it can be done but we find that operating electricians as well as designers, are much at variance in regard to the importance of high class construction, from both the efficiency and accident prevention point of view.

Claim Safety Features Explosive

Not every switch that has been produced and recommended by its maker or designer, possesses the qualities that should make it acceptable to the safety engineer and the electricians who must operate the switches. One of the greatest obstructions to introduction of switches that possess all the features necessary to make them both foolproof and efficient is that manufacturers are reluctant to engage in producing an article of high class, both in design and construction, while an inferior article can be produced, which too many electricians think is just as reliable for performing the same office.

A full discussion of the subject should bring out the following points:

The operating electrician should not be satisfied with a switch which does not possess the requirements necessary for economic operation. This could be possible in one that possesses all the requirements for a good safety switch.

The interlocking feature to positively prohibit closing of circuits before closing the switch encasements, which safety men seem to think is an important feature, is of less importance than is the matter of seeing a switch in operation while inspecting it.

A switch should be constructed for quick break and for quick closing, in the interests of both safety and efficiency and should be enclosed with a water proof encasement of noncombustible material.

The throw of a switch should be made from the outside of the encasement by level or rod, so that the circuit could be closed or opened without opening the casing.

Unless for a few exceptional purposes, switches should be fused on the side that is dead when the circuit is broken. Provision should be made for locking switches open.

Deaths From Light Voltage

Ruggedness is a quality that depends on the arrangement of the material in the parts of a switch as well as dimensions. With contact surfaces sufficient in area to comply with the requirements of good practice, a lack of perfect contact, not entirely noticeable at first, may result in further deterioration that will become complete in time, therefore, perfect workmanship should be considered a very important feature in the construction of a switch.

Quite frequently attention is called to a case where a person has been killed by a shock from current of not more than 120 volts, and in each case it was claimed the fact was well established that the voltage could not have been higher. The claim that such low voltage cannot injure a person unless the heart is not in a normal condition, seems to be contradicted in one particular case brought to our attention, unless there was a remarkable coincidence regarding conditions that might be claimed to have existed. In the case alluded to, two men were electrocuted by contact with the same wire, in the same place and at the same time In addition to the serious direct results produced from shocks, are the results from overbalancing and falling, occasioned by momentary loss of self-control, through the disturbing influence of shocks.

It is certain that many severe shocks and deaths occur through contact with equipment supposed to be dead and harmless. No conductor of current has the power to reveal the voltage it carries and no person is so gifted they can divine whether or not it carries any current except when the divining power is aided by the sense of touch. If the impression, true or false, that one voltage was less dangerous than another had never gained a foothold, probably a more wholesome regard would exist for the danger that might lie in any piece of wire in almost any locality.

A declaration that any voltage is dangerous, might result in raising the standard for insulation of drop cords and other insulated wires or parts that necessity compels a person to handle.

Accidents Due to Carelessness of Men

Accidents occurring to men on crane run-ways are too frequent and are usually serious. The situation could be made fool-proof by tying the crane so that it can not move, but in regular mill practice conditions arise when operations cannot be stopped and something must be done on crane run-ways or in their vicinity, where the run-way affords the best and sometimes the only place to stand on or the only means for getting from one point to another. The situation must look like an innocent one when men disregard all instructions and get on these run-ways unknown to the crane operator, when their safety is dependent on the crane operator knowing they are there, and on controlling the movement of the crane to avoid injuring them. Even in localities where there is a standing place beside the run-way they will stand or sit on it, hang onto the rail by hand or with arm across it as though some hypnotic or other mysterious influence prevented them from moving.

The crane operator if he would, cannot watch the run-way like a locomotive engineer watches the track in front of his train. All his attention must be given to watching below him that no accident may occur.

Track Stops are Impractical

Somebody conceived the idea which may now be too popular, that track stops fastened to the rails could do no worse than wreck a crane if operator failed to stop within a prescribed limit. We have known of cranes hitting the stops at end of run-ways with such force as to wreck the cranes. If oper-

(*Concluded on page* 606)

Electric Furnace Power Problems

A Description of Tests of a 15-Ton Heroult Electric Furnace Which Indicate That Units of Larger Capacity Will Be Found Satisfactory Under Certain Operating Conditions

BY WALTER C. KENNEDY

THE use of the electric furnace in the steel industry has increased to such an extent that its permanency is now assured. During the early days of its development it was employed chiefly for high carbon and alloy steels, but it has now advanced to a stage where it may be economically used in the manufacture of lower carbon steels, comparable with the grades at present produced in open-hearth practice

The electric furnace, like the electric motor, has advanced directly with the comparatively recent and rapid growth of the modern power distribution systems. As nearly all power systems are supplying 60 cycle, 3-phase current, it is entirely pertinent to consider the growth of the use and size of the electric furnace along this line.

The majority of electric arc furnaces for the manufacture of steel or other ferrous alloys are of 6 tons or less capacity. Next in size are the 10-ton furnaces and the largest sizes in practical use in this country are of 15 to 20 tons' capacity per charge.

It is the intention of this paper to show a few electrical characteristics of a 15-ton heroult furnace operating on 60 cycle, 3-phase current. The results obtained indicate good performance. In fact, the author is confident that the time is not far distant when furnaces of increased sizes, using this same frequency, will be used.

Fig. 1 shows the arrangement of furnace leads, transformer and oil switches. The following table gives the data of the various parts of the equipment:

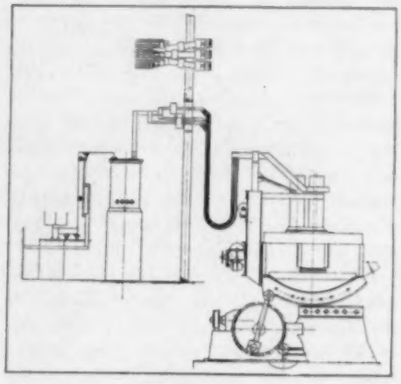


FIG. 1—ARRANGEMENT OF FURNACE LEADS, TRANSFORMERS AND OIL SWITCHES

Capacity of furnace—15 tons.
Number of electrodes—3.
Size of each electrode—24 inches diameter.
Transformer—one, three phase.
Primary voltage—22,000.
Secondary voltage—173-100.
Amperes per phase—12,500.
Kilovolt ampere rating—3750.
Reactance—approximately 10 per cent.
Electrode cables—12-2,000,000 c. m. per phase.
Lead resistance—.000016 ohms.

The transformer is 3-phase, water-cooled. It is arranged with star delta connection of the primary in order to give 173 or 100 volts on the secondary. The secondary coils are permanently connected in delta, the arrangement of connections being shown in Fig. 2. The automatic electrode regulating apparatus which was fully described in a paper presented at the annual meeting of the Association of Iron and Steel Electrical Engineers in 1916 by Harry S. Richardson will not be discussed here. There is one point, however, brought up in Mr. Richardson's paper that it would be well to confirm at this time. As mentioned by him, the instrument panel contains the following measuring instruments:

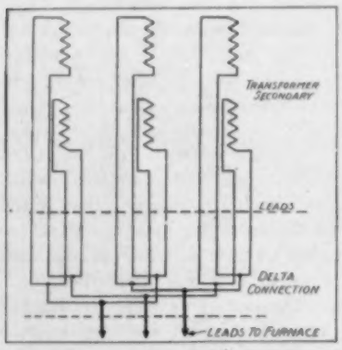
1 Voltmeter.
1 Curve drawing wattmeter.
1 Power factor meter.
3 Indicating wattmeters.
1 Watthour meter.

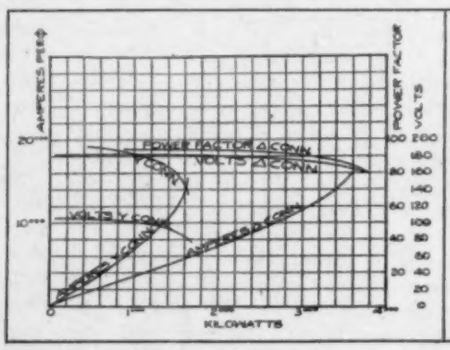
The wattmeters, one on each phase, should be changed to ammeters as some difficulty has been experienced in their operation. As shown later, the power factor of the furnace circuit, even on this large size and 60 cycles, is practically 100 per cent, so that ammeters would give a sufficiently close power indication. The total power is shown by the curve drawing polyphase wattmeter. The ammeter is more reliable, and moreover, the automatic regulator regulates according to current and this therefore is the indication that should be shown on the indicating meters.

Again, trouble may be experienced if wattmeters are used. The contact-making ammeters operating the electrode motor circuits operate against spring tension. Now, it is possible to adjust this spring tension and therefore to unbalance the current in that particular phase. If, then, the adjustments are made to show equal watts on the three phases, the voltages will be unequal, which will cause the arcs to vary in length. Trouble was experienced from this cause in which one arc (the unbalanced phase) burned the side wall of the furnace.

Fig. 3 shows the operating character-

A paper presented at the eleventh annual convention of the Association of Iron and Steel Electrical Engineers in Philadelphia, Sept. 10 to 14, 1917.





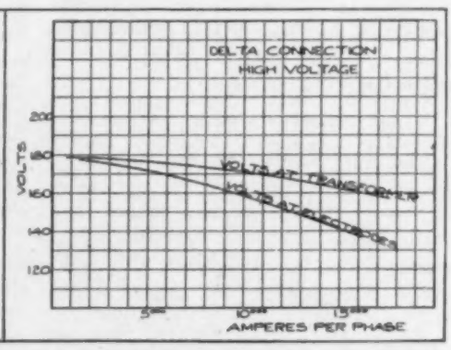
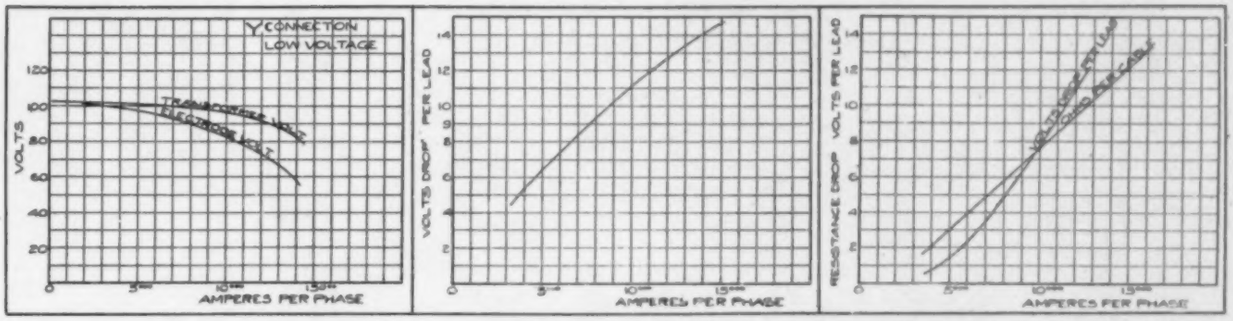


FIG. 2—ARRANGEMENT OF CONNECTIONS ON SECONDARY COILS FIG. 3—OPERATING CHARACTERISTICS ON STAR AND DELTA CONNECTIONS REFERRED TO KILOWATTS OUTPUT FIG. 4—VOLTAGE RELATIONS WITH HIGH CURRENT



FIGS. 5 AND 6—VOLTAGE RELATIONS FIG. 7—VOLTS RESISTANCE DROP REPRESENTING VALUE *AD* GIVEN IN FIG. 10

istics, both on the star and delta connections, referred to kilowatts input. In normal operation, the high voltage is used to melt down the cold charge, which requires about three hours and an input of from 2500 to 3000 kilowatts. After the charge is melted, the low voltage at about 1000 kilowatts is used to refine the steel. Also, the temperature proper for pouring is regulated by varying the input a short time before tapping.

The recording wattmeter chart, Fig. 12, shows a typical run. The furnace was charged with cold open-hearth scrap and pig, low in phosphorus. One slag only was used, the final analysis of the steel being approximately:

	Per cent
Carbon	0.15
Manganese	0.37
Phosphorus	0.02
Sulphur	0.03

Total kilowatt hours—7500.
Kilowatt hours per ton—500.

This is a representative heat although local conditions will considerably affect the operation and power consumption. It is interesting to compare the results of operation, Figs. 3 to 8, inclusive.

Fig. 3 shows the general operating characteristics. It is evident that on low voltage (Y-connection) in order to get a power factor about 90 per cent, that the maximum input is limited to 1000 to 1200 kilowatts.

It is better to keep within this range as the current is then kept down to 7000 to 8500 amperes and the conductor losses therefore correspondingly reduced, as shown in Fig. 8. On high voltage delta connection, 3200 kilowatts input can be obtained without any difficulty, although in practice 2400 to 2800 kilowatts is the usual load.

Figs. 4, 5 and 6 represent voltage relations for various currents. These were used to obtain the power factor and losses by the method shown by the Vector diagrams, Figs. 9, 10 and 11.

Determining the Voltage Relations

In Fig. 9, *O C* = Transformer voltage to neutral point, *O A* = voltage from electrode to neutral point and *A C* = the voltage drop across one lead.

The current in the arc is of unity power factor and therefore in phase with the voltage, represented by the line *O A*. If there were no skin effect, the distance *A D* would represent the actual resistance drop in the cables. If skin effect were present, conditions can be represented as shown in Fig. 10. Here *A B* represents the resistance drop as calculated by the measured resistance of the cables times the current.

B D represents the increased resistance drop due to skin effect which forces some cables to carry more current than others, thereby increasing the effective resistance. Actually, *A B* is very small; for example, 0.15 volt for 10,000 amperes, (2.6 kilowatts) so that it is neglected and the drop *A D* considered entirely due to skin effect. It is quite noticeable, in operation, that a few of the cables, about three or four on each phase, are distinctly hotter than others.

The power factor is represented by the cosine of the angle *C O D*.

In Fig. 7, the volts resistance drop represents the values *A D* given in Fig. 10. The ohms resistance per cable is obtained by dividing the volts drop by the corresponding current values. The apparent increase in resistance of the lead is due to the increasing action of the skin effect for heavier currents. Fig. 11, shows a diagram to scale for low voltage and 10,000 amperes. Values are indicated. It will be noted that the power factor is practically unity for all values of current and either low or high voltages.

The watts lost in the three leads are represented by the energy components *A B* and are shown in Fig. 8. Results indicate that the operation of large electric furnaces is entirely practical on 60-cycle circuits. Successful operation is dependent upon using two, or possibly more, voltages. At least, it is a big advantage to have more than one volt-

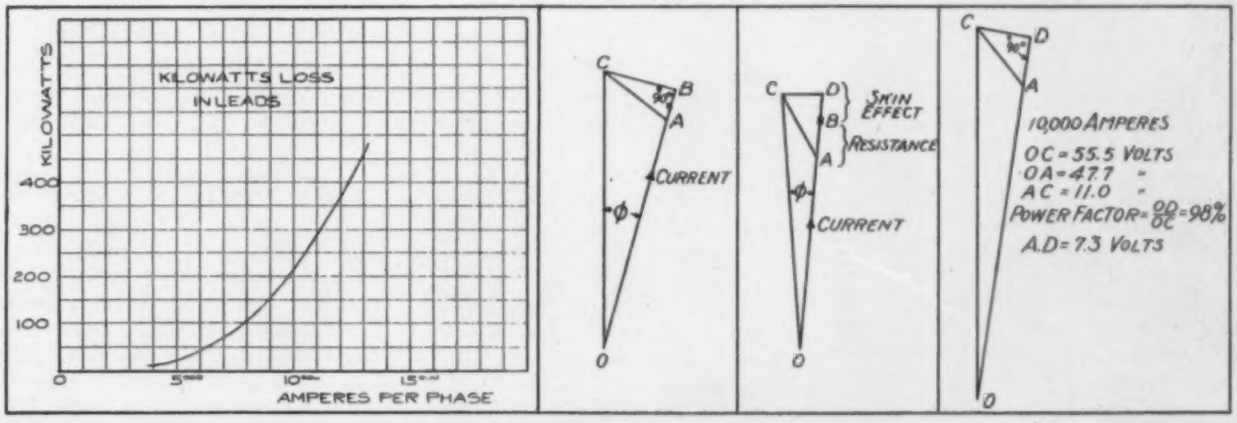


FIG. 8—WATTS LOST IN THREE LEADS REPRESENTED BY ENERGY COMPONENT FIGS. 9, 10 AND 11—VECTOR DIAGRAMS FOR OBTAINING POWER FACTOR

age available, the high voltage to be used for melting down and low voltage for refining.

In this furnace, as in all others at present constructed, the 3-phase leads are grouped into three cables before leading to the electrode holders on the furnace. The writer believes that this should be changed at least on 60-cycle furnaces, in order to reduce the skin effect. The phases should be broken up, say into six leads, with the phases interlaced. These six, or possibly 12, leads should run from the transformer to the furnace. The delta connection should be mounted on the furnace. It would be entirely feasible to do this and still take care of any current transformers in the secondary circuits. For example, in the present case, this would save probably about 30 kilowatt hours per ton of metal.

With a large furnace and high voltage, in order to obtain a heavy input, quick melting is possible. This reduces the loss by radiation and helps materially to lower the power consumption per ton of metal.

We can reasonably expect the use of electric furnaces in the future to be applied more and more in the manufacture of the lower carbon steels, as it is possible to obtain a better steel. This is true because the steel is more free from gases and oxides, and also the temperature, especially at pouring, can be more accurately controlled. The value of 500 kilowatt-hours per ton of metal is a good average figure. This power consumption was obtained at first when low phosphorus scrap was used and one slag. However, later results, using two slags, have not shown any great increase in power consumption.

The process followed in making steel is that common to all electric furnaces. This process comprises two stages: the oxidation stage and the reducing stage, each employing one slag. In the oxidation stage, phosphorus is removed in exactly the same manner as in standard open-hearth practice. In the reducing stage, sulphur and oxygen are removed. The neutral atmosphere of the electric furnace, containing no oxygen or sulphur, is an advantage.

A second slag is made containing calcium and carbon in excess. The sulphur is removed as calcium sulphide. The completion of the reducing action is indicated by the presence of calcium carbide in the slag. The better quality of electric steel is believed to be due to this last, or reducing stage, with the neutral and nonoxidizing atmosphere of the furnace.

Safeguarding Electrical Equipment

(*Concluded From Page* 603)

ators cannot always keep in mind the two limits of travel that are regular and frequent stopping places, how can they be expected to keep in mind when already overloaded with care, new stopping places which can become fixed in the mind only by long association with the situation?

Cannot the situation which forms the subject of this discussion be cared for by arrangement of the wire installation, so that a simple appliance can be set at any point on the track which will break the current, and this in turn apply brakes to the crane? Also this would be adding a new method for protection that might or might not be complied with, but between the two methods, stopping a crane with an obstruction that adds a new hazard, and stopping it by manipulating the current, the latter should have the preference. A simple method for breaking the current would be more sure of application than installing track stops which take time and labor for placing and removing.

Some very serious accidents and some heavy property losses have occurred from failure to control the ladle hoist of iron and steel pouring cranes. Aside from handling ladles, some of the operations performed by the hot metal hoists are, moving of railroad cars by side pulls, dragging heavy material on the ground, swinging battering rams, shaking out skulls, etc.

The dropping of solids by a crane is attended with no further danger than hitting somebody within an area of the ground it covers. By dropping molten metal the area of ground comprised within the danger zone is very many times larger, and in addition the danger extends to situations above, where it is less easy and sometimes impossible to escape.

The mill operating superintendent usually dictates what operations shall be performed by the machinery in his charge. He requires the department furnishing the machinery to keep it in order. He may not consider that handling of enormous weights, like a ladle with its yoke or spreader between blocks and the metal the ladle carries, is a delicate operation that is dependent on many factors, among them the perfection of various intricate parts. These parts are designed with a view of performing an operation that only requires a limited number of changes or movements. Any additional movements must tend to cause deterioration of some of the vital parts and might cause serious damage to some of them before the crane operator or inspector had a chance to discover it.

Practical Welfare Work in Foundries

BY S. W. ASHE

FOR some time many large foundries have carried on welfare work. Foundries that have undertaken such work are still continuing it indicating that they feel it has been wise. However, it is difficult for the small plant with limited means at its disposal to know just what to do.

Statistics show that from 50 to 60 per cent of accidents are due either directly or indirectly to those employed less than six months. These accidents are due either to the carelessness or inexperience of the new man in either injuring himself or someone else. Thus if means can be developed for holding workers in employment for longer periods or decreasing labor turnover to reasonable proportions, accidents will automatically be reduced 50 per cent in addition to heavy accident rates we find in plants with a high labor turnover, much restlessness, poor *esprit de corps*, little initiative and low efficiency.

There is no factor which means quite so much to an employe as the factor of stability. Where attempts are made to regulate production, so that employes are not periodically out of work, a better condition is created than in those places where a continual feeling of uncertainty exists. High labor turnover is the cause of more ills than it is ordinarily given credit for.

We can always trace some good in any form of welfare work, depending upon the angle we view it from, but the question naturally arises as to what counts the most. We should place ourselves in the position of the average employe and ask what really counts the most and what things in emergency we could dispense with. It is evident from this viewpoint, with the present high cost of living and with war conditions, that things which bear a direct relation to the employes' salary are the things which count the most. These are the

Presented at annual congress, National Safety council, New York, Sept. 11-14. The author, S. W. Ashe, is associated with the General Electric Co., Pittsfield, Mass.

things which necessarily exert the greatest holding influence. Company gardens, bonuses, selling articles, such as coal and insurance at cost, have the greatest weight these times. Where we get employes in the habit of saving their money and purchasing in bulk at the proper season we are not only establishing the fundamentals of thrift but at the same time we are solving many of the problems of labor turnover.

The average workingman has a large amount of free time at his disposal which should bring him in, if properly used, a fair revenue and when fall comes if this man has his cellar full of winter's coal, wood and vegetables and is in good physical condition as a result of his out-of-door activities, his whole viewpoint towards life and his company will change and he will stick to his job.

Providing a company garden is equivalent to creating a medium whereby the employe can use his spare time to advantage and obtain a revenue which reduces considerably his living expenses. The employe benefits considerably by being in the open air, his spirits are better, his health is better and he is more cheerful and contented.

The accompanying illustration shows a part of the gardens at the Pittsfield works of the General Electric Co. Three hundred gardens were assigned, each 50 x 100 feet. Each gardener signed an agreement stating that he would take proper care of his garden. It was necessary to build 800 feet of temporary fence and run 1000 feet of water pipe line into the property. A "raising bee" was therefore held one Saturday afternoon, the company supplying old lumber and pipe. It took just 40 minutes to complete the work. Care has been taken to check these 300 plots and with the exception of one employe who was dropped, every one has remained with the company and taken good care of his plot.

Coal the past winter was difficult to secure and the price was high. Some companies have tried the experiment of co-operating with their employes in selling coal at cost. At the Pittsfield works, we formed a coal club and sold 2000 tons of coal at cost. In securing the coal about one-half of the coal was purchased at a low figure and the other half was secured at a somewhat higher figure as it was purchased on a rising market. Nevertheless, the employes supported the proposition exceedingly well.

Many of our other forms of work are desirable and the men are generally interested in them, but they exert a holding influence to a lesser degree than the grouping discussed.

EMPLOYES GARDEN AT PITTSFIELD WORKS OF GENERAL ELECTRIC CO. WITH EXPERT EXPLAINING POTATO DISEASES

Safety Problems in Industrial Yards

BY F. G. BENNETT

ATTENTION has been directed to this phase of accident prevention, no doubt by severity, rather than by frequency of accidents. There has been a general improvement in all plant yards in the iron and steel industry, where accident prevention work has been definitely established. This has been brought about by the recognized methods employed in accident prevention, engineering and organization. The engineering phase of this work will be slowly noticeable in established plants, but must be recognized in new construction. There are certain features along structural lines that, in our present plants, can be modified, but an extreme hardship will be placed upon certain companies where present construction is so established that changes are almost prohibitive.

Proper Clearance

In considering intrayard railroads, we must recognize a different condition than that of main line railroads where speed is a factor. This one aspect must have a bearing in formulating clearance rules, either from a statutory viewpoint or otherwise. The state commissions throughout this country, which have jurisdiction over railroads, have thoroughly covered the clearance problem, but this seems to be applicable to fast moving trains.

In plant yards the movement of trains is practically limited to switching, placing of cars on loading tracks and other slow movements. In steel plants, there are movements that require speed, but this can be regulated and provisions made to insure safety. The subject of clearances would not be such a problem if new construction was to be considered, but in established plants where buildings have stood for a number of years, it is almost prohibitive to make modifications to which clearance rules can be applied.

At a recent public hearing before the committee which is endeavoring to formulate rules to govern intrayard railroads under the direction of the industrial commission of Ohio, the question was raised as to what a safe

Presented at annual meeting of National Safety council, New York, Sept. 11-14. The author, F. G. Bennett, is director of safety, Buckeye Steel Castings Co., Columbus, O.

clearance should be in plant yards, and a majority favored 6 feet 6 inches from center of track. The state of Ohio public utilities commission has adopted a clearance of 7 feet from center of track.

In plant yards in connection with railroad tracks, there are always conditions where special safety measures such as warning signs and other mechanical devices that will warn employes of close clearances, must be employed. In plants where old installations prevent the application of defined clearance rules, such measures are necessary.

Overhead clearances in plant yards are most commonly applicable to entrances to buildings and this must be carefully studied and considered when formulating a clearance rule. The roller type door is of particular importance in the matter of overhead clearances. If too great a clearance is designated, there is danger of the door not being raised its entire height of travel due to the fact that it requires more exertion to operate, and in some cases motive power would have to be used. This would be the case, no matter what clearance rule would be adopted, but the present requirement of Ohio in cases of this kind is a clearance of 21 feet. A clearance of less than 21 feet can be adopted and with the use of warning signs or other devices, should be ample in relation to safety. Other conditions in connection with the clearance problem such as double tracks, curves, switches, canopies, awnings, etc., can be satisfactorily handled after the lateral and overhead rules have been definitely arrived at. The speed of trains and locomotives in plant yards should receive attention and in most of our plants this is taken care of through discipline and rules.

Keep Your Yard Clean

A phase of this subject that cannot be lightly passed over is general cleanliness and tidiness throughout plant yards. This applies more directly to railroad tracks and an unceasing campaign to remedy this evil should be inaugurated. A clean-up gang in the larger plants, whose duties are limited exclusively to keeping the plant in a clean and orderly condition will find sufficient work to take up their allotted time. Barriers, constructed of timber of sufficient height to prevent material rolling down should be erected at the base of all piles which are located adjacent to tracks. These barriers, of course, should be placed in compliance with clearance rules.

In connection with railroad tracks there are, of course, quite a few accepted safety devices, such as enclosed frogs, switches, locking devices, derailers and signals.

Pedestrians in and about plant yards require protection and there are many devices employed at the present time in this respect. Warning signs and baffles at grade crossings near corners of buildings and at doorways furnish protection that is acceptable to safety engineers today. Buildings which are located close to railroad tracks should have the windows on the ground floors closed by screen or strips to prevent employes using them as a means of exit. Designated foot walks about plant yards will help to prevent employes from using other avenues and short cuts. The use of railroad tracks as pedestrial avenues should be prohibited.

Rules for Motor Trucks

Vehicular traffic, both horse and motor, demands attention, as the latter is being more commonly used each day. The usual traffic rules should apply to motor trucks in plant yards as are in use on the public highway. It is possible to exercise more direct supervision over drivers who are in plant yards than those on the public thoroughfares and as there are not many of this class of employes, good results can be attained. It is exceedingly important that proper roadways and cross-overs be provided and maintained in good order.

A great many plants, engaged either directly or indirectly in the production of munitions and supplies for the war, have adopted extraordinary measures in the matter of protection from plotters and others intent upon interfering with this work. The lighting of plant yards by means of projected rays from searchlights has become popular, but all should give this matter close attention. The effects of the glare of these intense rays are well known and care should be exercised to see that railroaders and others are not subjected to the direct effect of these light. This applies also to street cars and outside railroads that may run close to the boundaries of a plant. If possible, these lights should be placed at a considerable height and better results can be attained by flooding the area in this manner than by locating these lights on fences and other fixtures near the ground.

There is no doubt as to the importance of safety work in yard practices and defined and studied methods should be employed. All must remember that employes of shops and buildings are permitted the freedom of plant yards at times and they practically constitute a third party.

Future of the Sheet Metal Industry

"As far as the immediate future of the sheet metal trade is concerned, particularly the tin and terne plate business, the casual observer would come to the conclusion that a number of factors are having a detrimental effect," it was stated by William W. Justice, vice president, N. & S. Taylor Co., Philadelphia, at a recent hardware convention in Pittsburgh. "The action of the government," Mr. Justice continued, "in showing consumers of tin plate wherein they can cut down their requirements for that article by packing certain perishable goods in paper cartons or wooden boxes instead of the customary tin plate boxes, and the high cost of terne plates for roofing materials causing consumers to use other kinds, would both seem to be harmful to the best interests of the trade. But to counterbalance these disadvantages, the demand for tin and terne plate during the last few years appears to be considerably increased, and as we develop, the country will probably come to realize that the world's markets will be of increasing magnitude, and that no well balanced manufacturing concern can be dependent on the domestic market for its entire outlet.

"We must learn at least one lesson, which this war has brought home to us, namely, to think in terms of world trade. We cannot be isolated either politically or in our merchandizing from foreign countries.

"In the opinion of those best fitted to judge, it is deemed extremely unlikely that we shall ever return to the low values existing before the war. It has been the history of other countries that the general level of wages for labor advances with each war. It will probably advance after this war, and continue on a high plane. The restoration period is likely to be a period of considerable activity. Better organization, better management, better knowledge of costs and better knowledge of trade relations will probably offset the usual American tendencies toward severe depressions and acute booms, which our business charts indicate as characteristic during previous decades."

The Chesapeake & Ohio railroad has bought 190 acres at Griffith, Ind., near Chicago, for use as a steam-electric terminal. This follows similar action by the Erie, Grand Trunk and Pennsylvania railroads and foreshadows extensive electrification changes to do away with steam traction in the Chicago district.

Safety Work Grows in Importance

Tremendous Interest Displayed in Proceedings of Sixth Annual Safety Congress Held in New York Last Week—More Essential Now Than Ever to Reduce Accidents

THE tragic necessity for putting forth extra effort at the present time to prevent industrial accidents and injuries in order to have as many men as possible fit for the trials of war was emphasized throughout the proceedings of the sixth annual safety congress held at the Astor hotel, New York last week. From three to five simultaneous sectional meetings were held every day. As usual the iron and steel and foundry sections were the center of attraction and the attendance at these meetings ranged from 300 to nearly 1000. The iron and steel section held three sessions, on Wednesday, Thursday and Friday respectively. In addition the foundry section held one session on Thursday morning.

Sanitation Emphasized

A number of interesting papers were presented at these sessions, a few of which already have been published in THE IRON TRADE REVIEW. The extemporaneous discussions which followed the presentation of the papers were spirited and informative. The necessity for paying more attention to shop sanitation was emphasized by a number of speakers. The modern tendency of safety engineers to broaden the scope of their work into the entire field of welfare and health service also was pointed out. It also is evident that American industry has been quick to take advantage of the valuable surgical discoveries resulting from the war.

The iron and steel sessions, which commenced Wednesday at 2 p. m., were presided over by George T. Fonda, chairman of the iron and steel section, assisted by Earl B. Morgan, vice chairman, and J. C. Smith, secretary. Mr. Fonda is safety engineer, Bethlehem Steel Co., South Bethlehem, Pa.; Mr. Morgan is safety engineer, The Norton Co., Worcester, Mass., and Mr. Smith, safety director, Inland Steel Co., Indiana Harbor, Ind. The proceedings at this session were reported in the Sept. 13 issue of THE IRON TRADE REVIEW.

The second iron and steel session took place Thursday afternoon. It opened with a paper by F. C. Bennett, safety director, Buckeye Steel Castings Co., Columbus, O., entitled "Safety in Yard Practice". This paper appears elsewhere in this issue. A formal discussion of Mr. Bennett's paper was presented by J. Stanford Brown, supervisor, department of labor, safety and welfare, Carpenter Steel Co., Reading, Pa. Mr. Brown emphasized the necessity for a daily inspection of yard cranes. At the Carpenter Steel Co.'s plant, he said, the reports of these inspections go daily to the chief electrician, the master mechanic and the head of the safety department. Railroad trains he said, are responsible for most yard accidents in steel plants. This feature of the problem, therefore, must be given special attention. Dr. Lucian W. Chaney emphasized this point by quoting statistics which show that between 1910 and 1913 steel works' accidents in all departments showed an average decline of 35 to 85 per cent while at the same time yard accidents decreased only 3 per cent. Dr. Chaney said one reason for this probably lies in the fact that the railroad equipment used for interplant transportation frequently is not up to the interstate commerce commission standard required of the trunk line railroads.

Sections Consolidated

In order to simplify the work of the Safety Council as a whole it was decided to consolidate the activities of the foundry and iron and steel sections. These sections in the future will be known as the metals and metallurgical division of the National Safety Council. The names of the officers of this division for the ensuing year accompany this report. It is probable that four sessions will be held by the metals and metallurgical division at the seventh annual Safety Congress next year. The place for the next meeting of the congress has not yet been selected. At the present time Cleveland is receiving the most serious consideration.

Safety in Sheet Mills

Frank E. Morris, safety engineer, American Rolling Mill Co., Middletown, O., read a paper entitled "Safe Practices in Sheet Mills". In the sheet mill department of the American Rolling Mill Co., Mr. Morris said, there are about 1100 employes and during 1916 there were only 107 accidents causing a loss of more than a day's time. Over 25 per cent of these accidents were to new, inexperienced men. Most of the injuries, he said, are cuts inflicted by the jagged edges of the sheets. In the cold rolling department these cuts have been largely eliminated by providing the men with sheepskin arm protectors. The danger of accidents also is greatly minimized by constant inspections and frequent blacksmith work on the chains and tong points. In conclusion, Mr. Morris pointed out that efficient safety work makes soldiers physically fit to fight.

A formal discussion of Mr. Morris' paper was presented by J. M. Woltz, safety director, Youngstown Sheet & Tube Co., Youngstown, O. This discussion will be published practically in full in an early issue of THE IRON TRADE REVIEW.

Guard Arms Remove Hazards

G. G. Evans, safety director, Brier Hill Steel Co., Youngstown, O., pointed out that cold-roll hazards may be reduced by the use of suitable guards. Many of the cuts resuting from opening stickers, he said, also can be prevented by the use of arm guards such as those described by Mr. Morris. J. C. Smith, safety director, Inland Steel Co., Indiana Harbor, Ind., pointed out the necessity for safeguarding the billy which must not be adjusted too close to the rolls. At the Inland mills, Mr. Smith said, the spanner bar is chained so it cannot fly around and strike anyone.

The cramps to which sheet mill employes are subjected were discussed at length. Several speakers were of the opinion that they were induced by the cold air blasts which have been provided in a number of mills. Recently floor gratings have been substitute for cold air nozzles in a number of mills with beneficial results. The cool air comes up through the gratings at low velocity and the worker, therefore, is not subjected to violent physical reactions.

An exhaustive paper on "Open-Hearth Hazards" was read by Leslie M. Rice, district safety inspector, American Steel & Wire Co., Worcester, Mass. Mr. Rice said special attention should be devoted to crane

equipment to be sure it is O. K. prior to every heat. The ladle also should be set in place early in the heat so that in the event of a breakout through the taphole no damage will be done. The furnace crew also should be drilled for dealing with bottom blowouts just as a fire company is trained. The rabble bars and other tools, Mr. Rice stated, should be hung up on hooks or laid away on shelves off the floor where they are likely to cause men to trip and fall.

E. B. Morgan, Norton Co., Worcester, described a portable metal bridge designed by his company to give access to the top of the furnace in cases where the arch fails. This bridge is lined with asbestos on the under side.

The necessity for carefully inspecting ingot molds was pointed out by George T. Fonda, safety engineer, Bethlehem Steel Co., who described an accident in which a butt in the bottom of a mold caused an explosion of metal that resulted in the death of two men. Mr. Fonda also discussed the hazards surrounding the pouring of box steel and described a car developed by the Bethlehem company to minimize these dangers.

The danger from explosions when pouring ingots also was pointed out by C. R. Lobbs, Midvale Steel Co., who described a shield he had found efficient. This shield is handled by the auxiliary hoist of the crane while pouring. Another speaker described a canopy shield which may be placed over the pouring platform to protect the men from wild metal. This shield need not extend beyond the sixth mold. J. C. Smith, Inland Steel Co., described a vertical shield placed opposite the first two molds. He also said the men on the pouring platform should be required to wear asbestos leggings and goggles.

Friday Morning Session

Dudley R. Kennedy, assistant to the president, Youngstown Sheet & Tube Co., Youngstown, O., opened the proceedings at the Friday morning session by explaining just why the safety movement is closely identified with industrial relations work. He said liability to injury to workmen who have been on the job less than 30 days is six to one as compared with those who have been employed more than 30 days. He cited statistics to show that in one company the labor turnover for one year was 187 per cent; also 85 per cent of the men who left were employed less than six months. Thus, he showed, the constant turnover of green hands is a prolific source of accidents. By the steady employment of men, keeping them satisfied and on the job, the tendency toward accidents is greatly decreased. In the discussion that followed Mr. Kennedy's talk, the difficulties of handling negro labor were brought out, this class of labor being inclined to be transient. The welfare expert of one large employer told of separate clubs that had been formed for negroes and other steps taken to kindle a spirit of loyalty, to which the negroes had responded splendidly.

Dr. C. A. Lauffer, medical department, Westinghouse Electric & Mfg. Co., Pittsburgh, addressed the meeting upon the subject of "Low Voltage Hazards". He told of various risks encountered by men working in proximity to electric current and explained methods of resuscitation employed at the Westinghouse plants. He laid particular stress on the education of the workmen themselves as a preventive to injury. In the general discussion which followed Dr. Lauffer's address, the "shock" method of resuscitation was explained. This method is practiced in some cases by dropping the patient or otherwise inflicting pain to bring about countershock, prior to the arrival of pulmotors and other respiratory apparatus. The dangers of so-called "low voltage" were also pointed out, men at times being careless with say 550 volts, when, in reality, with two-phase alternating current, the effective voltage may be multiplied several times.

Following the discussion of electrical hazards, a "round table" conference was held, presided over by Earl B. Morgan, the newly elected chairman of the iron and steel section. L. L. Park, safety and apprentice supervisor of the American Locomotive Co., Schenectady, N. Y., discussed "New Kinks in Eye Protection". In Mr. Park's paper and in the discussion which followed, considerable attention was given to the goggle subject. Mr. Park pointed out that in the first place it is the function of safety engineers to see that the right kind of goggles are adopted for various classes of work, and in the second place to persuade workmen to use them. The difficulty of keeping lenses clean, the insertion of special lenses in goggles for men with defective eyesight, and the inconvenience of carrying goggles when not wearing them are all taken under consideration with a view to possible remedial measures. It was shown that some companies encourage the use of goggles by their employes through the offer of rewards; others lay down strict rules requiring the wearing of goggles by all men in the shop. Cases were cited of presidents and other officials of companies being shown the door because of failure to observe the rule. The education of employes to protect their own eyes was recommended. The representative of one company said that through education the number of eye accidents in his establishment had been reduced from 13½ per cent of the total number of employes in 1913 to 3½ per cent in the first half of 1917.

Probably the most important development of that part of the meeting devoted to eye discussion was the presentation of proof that eye injuries are not caused by flying glass from broken goggle lenses. One company had noted only one such experience in 4500 cases of eye injury. Others had experienced none. This experience refutes the objections of many workmen who say the danger from broken glass is greater than from the chips themselves.

Safety Work at Bethlehem

J. R. Mulligan, assistant safety engineer for the Bethlehem Steel Co., South Bethlehem, Pa., described the steps taken in safety work by the Bethlehem Steel Co. He told in detail of the work of the safety committees, and safety teams and of the results achieved. He said not only had the number of accidents decreased by fully one-fourth in the past few years, despite increased plant activity, but that the safety organization had greatly improved the human relations throughout the plant. As evidence of this progress, he told of the results of the Liberty Loan campaign at the Bethlehem company's plants, through

The New Officers

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Editor
E. R. Rice

the aid of the safety organization, in which 27.8 per cent of the employes subscribed for bonds totaling $2,066,000, while about 93 per cent of all employes, numbering 64,000, subscribed for $5,777,000.

John P. Eib, supervisor of safety and labor for the Illinois Steel Co., Joliet, Ill., talked on "Lunch Rooms and Change Houses". Earl B. Morgan discussed "Problems of Returning Injured Men". This paper will appear in the Sept. 27 issue of THE IRON TRADE REVIEW. J. B. Ayres, superintendent of safety, sanitation and welfare, National Tube Co., McKeesport, Pa., who was on the program to discuss "First Aid", was unable to be present, because of illness.

Session on Foundry Safety

F. G. Bennett, safety director, Buckeye Steel Castings Co., Columbus, O., presided at the foundry sectional meeting Thursday morning, Sept. 13. He was assisted by F. W. Shepard, safety inspector, American Cast Iron Pipe Co., Birmingham, Ala., and S. W. Ashe, educational and welfare department, General Electric Co., Pittsfield, Mass., vice chairman and secretary of the foundry section, respectivly.

Following the formal reports of the officers of the section, W. E. Watters, National Malleable Castings Co., Melrose Park, Ill., presented a paper entitled "Methods of Training and Obtaining the Co-operation of Foundry Foremen in Safety Work". Mr. Watters pointed out that it is necessary to take a sympathetic attitude toward the men in the lower ranks in order to secure their co-operation. He recommended that the safety committees take part in the social activities of the men. Throughout his discourse, the necessity for approaching men on their social side was emphasized.

Unusual interest centered around a paper entitled "Treatment of Foundry Burns by Paraffine Substances", by Dr. E. F. Mutschman, chief surgeon, American Steel Foundries, Alliance, O. Dr. Mutschman was unable to be present and the outlines of his paper were presented by S. W. Ashe, General Electric Co., Pittsfield, Mass. Mr. Ashe took up not only the use of paraffine substances for dressing burns, but also the Carol-Dakin solution for preventing the infection of serious wounds, such as third degree burns. The methods of applying the Carol-Dakin solution and the paraffine dressing were described. It was stated these two remedies are probably the most important surgical discoveries resulting from the war. Mr. Ashe said the Carol-Dakin solution is 20 times as powerful as other antiseptics. Its success depends, in a large measure, on the skill with which it is applied.

J. Stanford Brown, supervisor, department of labor, safety and welfare, Carpenter Steel Co., Reading, Pa., said his company has been using the paraffine treatment for burns for three years with unusually satisfactory results.

W. L. Chandler, Dodge Mfg. Co., Mishawaka, Ind., asked whether the Carol-Dakin solution bites or stings and also how often paraffine applications are necessary in the case of burns.

Expert Medical Advice

His questions were answered by Dr. C. A. Lauffer, medical department, Westinghouse Electric & Mfg. Co., East Pittsburgh. Dr. Lauffer said the Carol-Dakin solution has considerable sting and that it is not comfortable. Also it may burn the skin surrounding the wound. In using the paraffine treatment for burns, Dr. Lauffer said usually it is necessary to dress the wounds daily. He also said that atomizers used to spray the paraffine frequently clog and give trouble. He described a method of soaking gauze strips in melted paraffine, laying them on the wound like shingles on a house. Preparatory treatment of the wound with the Dakin solution is always necessary in the case of third degree burns, he maintained.

F. W. Shepard, American Cast Iron Pipe Co., Birmingham, Ala., asked if it is good practice to allow first aid men to apply the Carol-Dakin solution or paraffine substances.

Dr. Lauffer replied that first aid men should not be permitted to use these treatments under any circumstances. He explained that the technic is complicated and said success cannot be expected unless the treatments are in charge of skilled practitioners. This advice was approved by other physicians attending the meeting. Dr. Lauffer said the paraffine treatment reduces the time required for a bad burn to heal fully 50 per cent. Also the wound heals practically without scar.

An interesting paper on the relation between labor turnover and safety work was read by F. W. Shepard, safety inspector, American Cast Iron Pipe Co., Birmingham, Ala. Mr. Shepard pointed out that in the past three years the number of employes at the American Pipe company's plant has increased 30 per cent. During the same period the number of men employed one year or more increased 176 per cent; the number of men losing less than four days' time in a year increased 327 per cent; the number of men working every day in the year increased 455 per cent; the production increased 5 per cent; and accidents decreased 47 per cent.

Welfare Work Reduces Turnover

Mr. Shepard ascribes these remarkable results, particularly the reduction in the labor turnover to the welfare and accident prevention work of the company. The results achieved are all the more remarkable when it is considered that a large per cent of the employes are colored. The American company promotes its own men, runs a medical and dental department, keeps up a workmen's benefit fund, operates a bank and supports a branch of the Y. M. C. A. Discipline is handled largely by a mutuality committee on which representatives of all the men have seats. The company recently has worked out a pension plan for its old employes.

A paper on "Practical Welfare Work in Foundries", by S. W. Ashe, General Electric Co., Pittsfield, Mass., is published in abstract elsewhere in this issue.

The foundry session concluded with a paper entitled "Mechanical Safeguarding of Electric Traveling Cranes", by J. Claude Smith, safety director, Inland Steel Co., Indiana Harbor, Ind. In reply to a question, Mr. Smith said he had not observed that cranemen's hours of labor have had any effect on crane accidents, although the 12-hour day is the rule. This was disputed by J. C. Feehan, factory inspector, State of Pennsylvania, Pittsburgh, who said there were four fatal crane accidents in the Pittsburgh district in 1916 which in his judgment could be ascribed to excessively long hours of labor. In one investigation, he said, the crane operators in the mill admitted they took naps while on duty.

A number of papers of interest to the iron and steel industry were presented at the general sessions on Wednesday and Thursday and also at the meetings of the health service section, railroad section and other sections. At the general session on Thursday morning, R. M. Little, a member of the United States compensation commission recently organized by the council of national defense,

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Norton Co.,
Worcester, Mass.

Vice Chairman
F. H. ELAM
American Steel Foundries,
Chicago

Secretary
DUDLEY R. KENNEDY
Youngstown Sheet & Tube Co.,
Youngstown, O.

described the results of the safety survey of navy yards, arsenals, etc., recently completed under the auspices of the National Safety Council. Mr. Little described this work as a patriotic service of the highest value.

R. J. Young, manager of the department of safety and relief, Illinois Steel Co., Chicago, presented a paper at the general session on Thursday entitled "Fundamental Principles of Safeguarding".

Exhibitions of Safety Appliances

An extensive exhibition of safety appliances was held at the Grand Central Palace under the joint auspices of the National Safety Council and the American Museum of Safety. The council's interests were represented by M. A. Dow, general safety agent, New York Central lines. The American Museum of Safety is managed by A. H. Young, formerly head of the safety department, Illinois Steel Co., South Works, Chicago. The large exhibit hall of the Grand Central Palace was filled. The educational character of many of the exhibits was noteworthy. In many cases commendable efforts were made to convey real information on safety problems rather than simply to advertise goods for sale. In addition to modern safety devices, several companies displayed photographs, charts, lantern slides and moving pictures showing methods of promoting safety and preventing accidents.

Among the exhibitors of safety appliances used in the iron and steel industry were the following: Julius King Optical Co., New York, goggles; The Strong, Kennard & Nutt Co., Cleveland, goggles; Merry Optical Co., Kansas City, Mo., goggles; Norton Co., Worcester, Mass., grinding-wheel safety devices; American-Mason Safety Tread Co., Lowell, Mass., stair treads; Universal Safety Tread Co., Waltham, Mass., stair treads; T. A. Willson & Co., Reading, Pa., goggles; F. A. Hardy & Co., New York, goggles; Westinghouse Electric & Mfg. Co., Pittsburgh, electrical safety appliances; Life Saving Devices Co., New York, lungmotors; Multi-Metal Separating Screen Co., New York, sand-blast helmets, etc.; Carrier Engineering Corp., New York, air conditioning devices; Cheesebro-Whitman Co., New York, safety ladders; Palmer Electric & Mfg. Co., Boston, switchboard safety devices; Standard Pressed Steel Co., Philadelphia, safety shaft hangers; Commonwealth Steel Co., St. Louis, railroad car safety appliances; Western Electric Co., Chicago, flood lighting equipment and electrical safety devices; R. P. Smith & Sons Co., Chicago, safety shoes for molders; Draeger Oxygen Apparatus Co., Pittsburgh, oxygen helmets; Standard Optical Co., Geneva, N. Y., goggles; Edison Storage Battery Co., Orange, N. J., storage batteries; Pyrene Mfg. Co., New York, fire extinguishers; The Powers Regulator Co., New York, automatic temperature controlling apparatus; Detroit Fuse & Mfg. Co., Detroit, electrical protecting devices; The Zeh & Hahnemann Co., Newark, N. J., safety devices for power presses; Metropolitan Engineering Co., New York, electrical safety devices; John Gibson, Detroit, Mich., safety lathe chucks; Clipper Belt Facer Co., Grand Rapids, Mich., safety belt fastenings.

Interesting and comprehensive exhibits also were presented by the National Safety Council, the American Museum of Safety, the American Red Cross, the United States Coast Guard, and several of the trunk line railroads, including the New York Central and Baltimore & Ohio systems.

Plenty of Steel

Will be Available to the Government For War, Says Gary

Ample supplies of steel for the government will be forthcoming, according to chairman E. H. Gary, of the steel corporation, when interviewed at Chicago, enroute to New York last week from a three months trip to Alaska and the northwest. "I can say that the steel industry of the United States can supply all the steel that our government may demand," said Judge Gary. "Ample raw material is available and no physical problems confront us. The general business in the country is good; at least there are no discouraging signs.

Speaking of the war, Judge Gary said, "As in all great wars, the side with the most money will win. United States has one-third of the world's wealth." Judge Gary sees no prospect for an early peace. "Two years ago there might have been a settlement of the war on a pretty fair basis," he said, "but now, with that chance past, with the present location of the opposing armies and with the great fighting capacity of the allies strengthened by the United States, I don't believe that either side can make a proposal that will be acceptable to the other side."

Installs Dumper

The Wellman-Seaver-Morgan Co., Cleveland, recently has completed the installation of an electrically-operated movable car dumper at the plant of the Alan Wood Iron & Steel Co., Swedeland, Pa. The equipment is of the usual Wellman-Seaver-Morgan type.

The eighth annual convention of the American Manufacturers Export Corp. will be held at the Hotel Biltmore, New York, Oct. 10, at which time officers and two directors will be elected.

Larger Works

To be Completed by Cromwell Steel Co. Through Reorganization

Completion of the new plant of the Cromwell Steel Co., now under construction at Lorain, O., is to be carried out speedily as originally planned as a result of a reorganization of the company just effected. Important Cleveland iron ore and pig iron men have become actively identified with the enterprise. Max McMurray, since 1904 general manager of blast furnaces for M. A. Hanna & Co., has been made president of the company; George P. Steele, First National bank, Cleveland, treasurer; and G. L. Jones, secretary. The directors, in addition to Messrs. McMurray and Steele, include J. C. Cromwell, E. S. Griffiths, W. H. Purcell, Parmely W. Herrick, George H. Beaumont, of Pickands, Mather & Co., Robert L. Ireland, until recently with M. A. Hanna & Co., and A. C. Ryan. The capitalization of the company, which originally was $2,000,000, is to be increased to $3,500,000, by the issuance of an additional $1,500,000 in stock already authorized.

Work on the new plant of the Cromwell Steel Co., which has been under way for about a year, is well advanced. Four 75-ton open-hearth furnaces have been building and two of these now are in operation. The ultimate layout has made provision for 10 additional furnaces. The present output of the company is being marketed in the form of ingots, pending the completion of finishing capacity. The latter will include several 20-ton hammers for forging blooms, a 3-inch bar mill and other stands. The plant ultimately is planned to produce 700 tons daily of forging steel, which is to go largely into the manufacture of automobile parts. The company has in view the eventual erection of blast furnaces to supply pig iron for the steel works. The site of the plant, which embraces 233 acres on the eastern bank of the Black river, opposite the works of the National Tube Co., affords ample grounds for these future extensions, together with direct unloading facilities for ore from carriers in the river.

Sales Consolidation

The Marlin-Rockwell Corp., which now controls the Standard Roller Bearing Co., Philadelphia; the Rockwell-Drake Co., Plainville, Conn., the Mayo Radiator Co., New Haven and the Marlin Arms Co., New Haven, has decided to sell all products of these companies with the exception of fire arms, through the sales organization of the Standard Roller Bearing Co.

Standards Urged by Mill Engineers

Members of Association of Iron and Steel Engineers Discuss Standardization of Electrical Equipment, Safety Devices, Mill Drives and Arc Furnaces at Annual Convention

ACTION pointing the way to greater concentration in standardizing electrical equipment, with a likelihood that standards hereafter will be prepared by special committees of experts who will report for approval directly to the board of directors, was salient among the important developments at the convention of the Association of Iron and Steel Electrical Engineers, held at the Bellevue-Stratford hotel in Philadelphia, Sept. 12 to 14. Heretofore standardization proposals have been reported for discussion and action on the floor of the convention. Electric furnaces, with greater capacities than 15 tons, operating on 60-cycle, 3-phase current, were predicted for the near future. Electrical equipment for reversing rolling mills was thoroughly discussed.

C. A. Menk, superintendent of the electrical department at the Homestead plant of the Carnegie Steel Co., Munhall, Pa., was elected president of the association for the coming year. S. C. Coey, formerly with the Youngstown Sheet & Tube Co., was elected first vice president and D. M. Petty, superintendent of the electrical department of the Bethlehem Steel Co., second vice president. J. F. Kelly of the National Tube Co., McKeesport, Pa., continues as secretary, and James Farrington of the La Belle Iron Works, Steubenville, O., as treasurer.

A patriotic session, which was held Wednesday afternoon, was addressed by Dr. Harry S. Drinker, president of Lehigh university. Dr. Drinker supported the contention that young men, as well as leaders of industry should not rush thoughtlessly to the front. Young men inclined toward sciences should be encouraged to pursue their engineering studies, since the engineering requirements of the world, now and after the termination of the war, will require the best ability we can offer. "Men with a finished education will be needed now and later, more than at any time previous in the world's history," said Dr. Drinker.

The annual banquet held Wednesday night was presided over by Gano Dunn, president of the J. G. White Engineering Corp. The speakers included F. G. Egan, retiring president of the association, the Hon. Theodore E. Burton, E. J. Cattell, John B. Finley and Thomas Raeburn White.

Visits to the plants of the Alan Wood Iron & Steel Co., the William Cramp & Sons Ship & Engine Building Co., the Midvale Steel Co., and the Baldwin Locomotive Works, were among the features of the convention.

Further Standardization Recommended

Results of a questionaire recently employed to collect information as to the various features of electrical equipment now in use in iron and steel plants were set forth by the standardization committee. This report was accompanied by an explanation of the advantages of standardization and by a revised list of the association's specifications and standards for electrical overhead traveling cranes. For next year, the committee recommended the compilation of data from all the iron and steel plants in the country using electrical power, and embodying information in regard to the various types of equipment in use in order that conclusions regarding phase, frequency, voltage and other factors may be reached. Standardization of the industrial motor to the point of absolute interchangeability of the complete motor, it was contended, would bring about a better motor at less cost, as a result of real competition; a reduction in the number of spare parts required and less confusion in preliminary layouts.

Discusses Electrical Rolling Mills

The operation of electrical reversing rolling mills, a subject to which considerable attention has been given during the past five or six years, was discussed by Ralph D. Nye, electrical engineer, United Steel Co., Canton, O. This paper contained data on the performance of 34-inch bloomer, having capacity for breaking down 50 tons of 18 x 20-inch ingots per hour, into finished billets, using 21 to 23 passes; and a 35-inch bloomer designed to roll 75 to 90 tons of 20 x 21-inch ingots per hour, into finished 4 x 4-inch billets, using 19 to 21 passes. The average consumption of the larger mill is 29.7 kilowatt hours per ton, and the smaller mill, 19.7 kilowatt hours. Improvements which may be incorporated in electric drives for reversing rolling mills, were discussed in a paper by D. M. Petty, superintendent electrical department, Bethlehem Steel Co.

In discussion of Mr. Petty's paper, M. A. Whiting, electrical engineer, power and mining department, General Electric Co., Schenectady, N. Y., told of recent observations of two reversing mills equipped with modern electric drives, in which both mill motor and generator are shunt machines. One of these is a 2500-horsepower, continuous rated equipment driving the Ashland Iron & Mining Co.'s 35-inch bloomer; the other, practically a duplicate, drives the Keystone Steel & Wire Co.'s 34-inch bloomer. Neither plant has completed all of its open-hearth and soaking pit capacity, so that it has been impossible to keep either mill busy. However, the following facts have been brought out by operations up to date; the generator and motor commutate excellently at all rates and speeds; the speed does not drop perceptibly when the steel enters the rolls; the mill accelerates rapidly after entering the piece; the mill responds quickly to every movement of the controller handle, a very important quality. When the steel tends to cobble, it is often necessary to stop the mill very quickly, back the piece out and manipulate it in various ways. Under these conditions, the quicker the response of the mill to the movement of the controller handle, the more satisfactory is the operation. When trying to save cobbles, the cooling due to a few extra seconds may mean a complete cobble, where otherwise the piece might have been rolled successfully to proper gage and finish. The controller handle, according to Mr. Whiting, may be thrown very rapidly from any position forward either to the off position or to any reverse position, the retardation and acceleration being automatic to such a degree as to avoid all excessive overloads. This is also very important under some circumstances, as it is not always practicable for the operator, however intelligent and conscientious, to move the controller handle deliberately. He referred particularly to circumstances under which a piece begins to cobble after entering, and the operator, to save the piece, instinctively throws the controller lever

to the off position or to the reverse position.

"The use of electric furnaces in the steel industry has increased to such an extent that their permanency is now assured," said Walter C. Kennedy, sales engineer, Cutler-Hammer Mfg. Co., Milwaukee, in a paper, "Heroult Electric Furnace." Electric furnaces are now being used to manufacture low carbon steels comparable with the grades produced in the open-hearth furnaces.

Utilization of Waste Heat

Because of the decreasing supply of natural gas and the increasing price of coal, the question of fuel for power is becoming one of more importance to the iron and steel industry, said Brent Wiley, commercial engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Power plants now generally are composed of a number of comparatively small and inefficient units. "The broad problem of economical power generation for practically every steel plant today," he said, "includes the study of one or more of the following points: Proper utilization of the heat units of coke oven gas from the coke plant; blast furnace gas in pig iron production; waste gases from open-hearth and reheating furnaces." Mr. Wiley stated that it is probable that the steel plant of the near future, consisting of coke plant, blast furnace, open-hearth and rolling mill departments, will be so designed that the several advantages as offered by each phase of heat economy will be so co-ordinated that no heat will be burned directly under boilers, and in addition to furnishing all the power required for the plant operation, a fair percentage will be available for sale.

S. S. Wales, in discussing Mr. Wiley's paper, took up the statement as to the utilization of coke oven by-products, blast furnace gases and open-hearth waste heat. "The generation of power for steel plants, while covering a large field, is still subject to certain limiting factors which will automatically eliminate many of our apparent resources," said Mr. Wales. His discussion included a detailed heat balance of a blast furnace producing 500 tons of pig iron a day.

Protecting Electrical Equipment

"Safeguarding Electrical Equipment" was the title of a paper read by Walter Greenwood, safety engineer, Ohio works, Carnegie Steel Co., Youngstown, O., in which the author discussed the general principles which should govern in the installation of automatic engine stops, safety measures in the construction of electric switches; whether or not fixed stops should be placed on tracks of runways to prevent cranes from passing a given point intermediate between the ends of the runways, and whether or not the hot metal hoist of a ladle crane should be used for any other purpose than handling ladles. He recommended that blast engines be provided with electrically operated valves along with other speed control equipment that could be made to check the speed of the engine without stopping it entirely.

In a discussion of Mr. Greenwood's paper, D. M. Strong set forth the general principles that should govern the design and construction of electric switches from the standpoint of safety, and which generally have been agreed on by engineers who have given the subject serious consideration. These include the total enclosure of all current-carrying parts; suitable means for operating a switch from the outside of the enclosing cases; a design that will permit of inspections of the working parts under all conditions of operation without interrupting the production of the machinery controlled by the switch; a safe and positive means of locking the switch in the off position. E. S. Stickle, Western Electric Co., and C. C. McIlyar, chief electrician, Otis Steel Co., Cleveland, also participated in the discussion.

Tool Steel Mill Gears

Rolling mill gears and pinions, which by a special process are hardened to a depth of 3/16 to ¼-inch, and in which the hardening is virtually uniform, instead of tapering off from a very hard to a soft center, as is usual in case hardening, were described in a paper by E. S. Sawtelle. The paper described the great durability possessed by gears and pinions hardened by this special method and recounted the various uses to which they may be put to advantage.

E. H. Martindale, National Carbon Co., Cleveland, submitted a paper on the manufacture, selection and use of carbon brushes. He discussed carbon, graphite, carbon-graphite and metal-graphite brushes and told of the care which is necessary in selecting the materials, in manufacturing under modern conditions, and of the necessity for constant research and investigation.

Various methods developed by central station power plants to insure uninterrupted supply of current to their customers, were described in a paper submitted by Joseph McKinley and Ray L. Baker. The central station interests are expending tremendous amounts of money to perfect their systems, to such an extent, said the author, that it is safe to assume that the degree of reliability of their service could not be excelled by any plant which the average steel mill could afford to develop.

James Farrington, superintendent, electrical department, La Belle Iron Works, Steubenville, O., and R. H. McLain, presented a paper entitled "Grab Bucket Coal Hoists Operated by Alternating-Current Motors with Dynamic Braking and Regenerative Braking." The authors presented a brief comparison of alternating and direct-current motors installed for hoisting coal and then detailed the equipment and course of procedure to be followed in utilizing alternating current installations.

"Fuel Economy by Co-operation in Establishing a Better Practice in the Operation of Stokers and Boilers" was a title of a paper submitted by Joseph G. Worker. Richard H. Rice submitted a paper on turbo-generators.

Large Coal Lands

Acquired by Steel Corporation in Kentucky—Will Coke at Chicago

Whitesburg, Ky., Sept. 17.—The entrance of the United States Coal & Coke Co., a subsidiary of the United States Steel Corporation's into the coal field of this territory has caused much comment. Several days ago representatives of the company purchased 20,000 acres of fine coal lands lying along Looney creek, south of the city on the Letcher-Harlan border and announced that the construction of a model mine city would be undertaken. At this time 2000 men are starting work on the establishment of a modern, up-to-date community, cutting forests, building roads, opening mines and constructing modern residences. Saw mills are being installed for the manufacture, from the native forests of the most of the building material necessary. Among the conveniences planned are water works, electric lights, modern streets, telephone system, churches, schools, amusement halls, welfare buildings, Y. M. C. A.'s, banks, etc. A brick plant will be installed, while the building stone necessary will be quarried from the mountain sides. The coal will be shipped to Gary, Ind., where it will be coked for use of the Steel Corporation. Within three months it is planned that the new city will have 5000 people employed.

An eastern corporation, composed of Boston and New York capitalists, is closing deals on about 10,000 acres of fine coal lands in the Big Black mountain section south of here, where a modern coke manufacturing plant will be installed.

July Metal Exports Decline Sharply

Outboard Shipments of Pig Iron During July Amount to 32,368 Tons a Decrease of 50,000 Tons Over June—Gross Tonnage of Iron and Steel Drop from 614,600 to 357,776

FOLLOWING a month when the exports of iron and steel established the greatest record in history, the shipments to foreign countries of metals tapered appreciably during the month of July according to the complete reports of the bureau of foreign and domestic commerce. Although the submarine menace did not increase its activities during July and, seemingly, there is no tangible reason for the decline, it is possible that the announcement of embargo regulations at this time exerted a sentimental influence even though the law was not put into force until some weeks later. Whether this reduced rate will be maintained during the coming year or not is open to discussion. Doubtless, our allies will demand and receive enormous tonnages of steel until the conclusion of the war and for some time after, but in consideration of the steelmaking capacity of the country and the domestic demands, there seems little likelihood of the record of the last fiscal year being exceeded during the next 12 months.

IRON ORE IMPORTS, GROSS TONS

	—July—		Seven months ending July,	
	1917	1916	1917	1916
Spain	.....	17,517	133,906	96,799
Sweden	6,358	21,213	52,355	131,663
Canada	18,418	52,949	56,087	115,454
Cuba	48,150	54,175	278,863	388,151
Oth. countries	16,803	10,901	28,747	60,695
Total	89,729	156,755	549,958	792,762

EXPORTS, GROSS TONS.

	Pig iron	Semi-finished material
1916		
Jan.	18,719	55,315
Feb.	15,061	87,306
Mar.	19,439	107,696
Apr.	18,518	88,764
May	28,293	142,782
June	48,770	116,425
July	28,718	135,827
Aug.	60,264	160,921
Sep.	64,122	163,104
Oct.	101,756	162,679
Nov.	102,786	125,038
Dec.	105,195	162,901
1917		
Jan.	69,146	183,656
Feb.	49,018	131,566
Mar.	69,629	193,469
Apr.	44,783	174,039
May	61,112	168,158
June	48,770	116,316
July	32,368	112,085

During July the shipments of pig iron abroad totaled 32,368 tons as compared with 81,999 tons exported in June, a decrease of nearly 50,000 tons. Likewise, the export of steel billets, ingots and blooms in July dropped off from 192,133 tons shipped to foreign buyers in June to 112,085 tons in July, a decline of approximately 42 per cent. A considerable falling off in the shipment of sheets and plates is also recorded. July shipments amounted to 55,320 tons, comparing quite unfavorably with 96,891 tons during June. Foreign shipments of rails, steel bars and structural steel, which in June showed a slight decline when compared with the previous month, dropped off in July to 19,704 tons, 32,110 tons and 14,633 tons respectively. The decrease in the tonnage of rails exported is most marked, the decline based on the June figures amounting to more than 50 per cent.

IRON AND STEEL EXPORTS, GROSS TONS

	July,		Seven months ending June,	
	1917	1916	1917	1916
Scrap	3,196	4,788	127,948	103,684
Pig iron	32,368	28,718	408,055	178,118
Steel billets, ingots and blooms	112,085	135,827	1,142,032	734,084
Wire rods	8,503	14,666	79,057	96,244
Steel rails	19,704	21,822	315,237	262,953
Steel bars	32,110	78,946	374,384	445,694
Iron bars	3,438	6,915	34,156	47,020
Struc. iron and steel	14,633	26,583	181,188	154,952
Hoops, bands and scroll.	5,091	3,059	31,961	25,048
Sh'ts & plates	55,320	39,228	471,516	278,551
Tin and terne plate	16,718	18,760	145,138	141,597
Barbed wire	14,543	47,473	104,095	252,667
All oth. wire	12,890	36,079	116,947	162,132
Cut nails	196	622	1,936	2,508
Wire nails	7,156	12,328	53,868	84,530
All oth. nails incl. tacks.	912	830	12,507	4,879
Pipes and fittings	14,459	20,885	116,820	107,083
R. R. spikes	1,006	1,494	11,965	17,194
Bolts, nuts, rivets and washers	2,833	2,285	17,555	16,702
Horseshoes	154	829	1,619	5,821
Cast radiators	461	193	3,829	1,198
Total	357,776	502,330	3,751,813	3,122,659

The aggregate of all exports of iron and steel, expressed in gross tons, amounts to 357,776 tons for July as compared with 614,600 tons, the record June export movement. The value of the July exports is given as $77,782,294, an increase of approximately $7,600,000 over the value of the shipments made during July, 1916. For the first seven months of the calendar year the aggregate gross tonnage exported amounts to 3,751,813. During the same period of 1916, 3,122,659 tons were exported. Roughly speaking, the average shipments made during the first seven months of this year have been 20 per cent above those made during the same months of 1916. It is interesting to note, however, that the exports for the first seven months of 1917 are valued at $713,426,557 while the exports made in the same seven months of 1916 are placed at $444,449,440.

A glance at the table of gross tons of iron and steel imports shows an enormous increase in the amount of scrap brought from foreign ports. In consideration of the high prices prevailing in the scrap market this is not surprising as old materials not only provide satisfactory ballast but profitable cargoes. During July, 13,107 tons of scrap were imported, against 4615 tons brought in a year ago. During the first seven months of the year, 150,000 tons of scrap were imported by consumers in the United States. Imports of rails have dropped off about 75 per cent while the shipments of structurals to this country have increased considerably, judging from the figures for the first seven months of each year.

IRON AND STEEL IMPORTS, GROSS TONS

	July,		Seven months ending July,	
	1917	1916	1917	1916
Scrap	13,107	4,615	150,576	34,289
Pig iron	5,672	6,434	49,319	67,179
Steel ingots, blooms and billets	6,974	1,348	24,538	17,038
Wire rods	168	495	193	2,566
Rails	579	546	4,321	16,520
Bar iron	968	987	1,503	4,840
Structural	1,128	7	1,682	1,012
Sheets and plates	263	192	1,100	1,094
Tin and terne plate	.....	150	124	671
Total	28,859	14,774	233,356	145,209

IMPORTS AND EXPORTS, GROSS TONS.

1915	Imports	Exports
July	20,858	380,340
August	27,556	405,850
September	23,345	382,113
October	34,318	349,843
November	37,131	362,764
December	35,408	353,853
1916		
January	15,824	360,102
February	20,279	368,980
March	15,159	438,649
April	20,176	384,452
May	32,114	540,580
June	26,786	526,759
July	14,729	503,187
August	32,257	597,739
September	25,559	643,762
October	30,169	610,110
November	42,545	554,856
December	44,134	580,957
1917		
January	40,192	608,105
February	24,379	449,099
March	37,280	606,559
April	48,213	519,397
May	26,013	588,514
June	28,419	614,600
July	28,859	357,776

Too Many Boards Mix War Control

Confusion Grows at Washington as Uncertain, Inadequate and Conflicting Authority Among Advisory Bodies Blocks Efficient Co-operation With Government —Army and Navy Opposes Plan of War Industries Board

WASHINGTON, Sept. 18.—America's unpreparedness for war actually has begun to assert itself. The chaotic state of affairs existing in the operation of the war industries board in conjunction with the army and navy departments is reflected in the business world in such a way to jeopardize the nation's prosperity. From all sides come cries of dissatisfaction with the system by which the government is making haste slowly. Something startling is expected to happen and happen very soon.

Insertion of section 3 in the food control bill complicates the situation for the business men and manufacturers in the council of national defense, but the very existence of the organization in which these men are members, who have been and can be of great assistance to the government, has, with its lack of power, developed a condition that will require sweeping readjustment if business and the government are to co-operate successfully in prosecution of the war. The sooner the administration realizes this the better.

Service Officers Oppose System

The fact has long been known that army and navy officers, authorized by law as the real buyers for their respective departments, are openly opposed to the system of the council as conducted through the war industries board which was created by the council to consolidate in a few hands the functions of the numerous sub committees. The officers say they are glad to receive business advice from the board and the council's committees but they object to efforts of the board to do more than that with its evident lack of military knowledge. Some manufacturers and contractors even decline to do business with the board, prefering to carry on negotiations under the system in vogue before the war, and which is still not legally changed.

Yet the lack of smoothness in the running of the war machinery is not blamed entirely on the war board. Much of it is said to be due to the inefficiency of the federal trade commission. This is shown in the fact that the President, after getting the commission's data on the cost of producing steel, turned around and asked the war industries board to supplement the findings with its own additional investigation. Another instance taken as an example of the commission's inability to properly size up matters is Fuel Administrator Garfield's assurance to coal operators he will recommend the President change the prices fixed if they be shown unjust and that complaints, with additional information, be given in person to him. The President named the prices upon the supposedly just findings of the commission.

Another contributing cause in the muddle is due neither to the war industries board nor the federal trade commission, but rests entirely with the military organization, chiefly if not wholly with the army. This is the wholesale commissioning as captains and lieutenants, and in some cases as majors of men trained only in business and not in military life. It is declared they cannot properly exercise military and business functions conjunctively any more than can some of the men in the war board and its subcommittees.

Clearly the army and navy departments, increased to tremendous size by the exigencies of war, need business as well as additional military advice, but apparent lack of cohesive organization and the certain absence of centralized authority has brought about the confused conditions. The war industries board admittedly is without power and the evident effort of some members in its organization to assume authority may prove disastrous.

When the house committee on appropriations was investigating government requests for the money recommended in the $4,800,000,000 budget Congressman Sisson of the committee, in questioning F. A. Scott, chairman of the war industries board, said "responsibility for all purchases rests with the proper authorities of the army and navy and not with you gentlemen." To this Mr. Scott replied, "That is absolutely so." In explaining the board as a clearing house for army and navy needs, Mr. Scott made this significant statement: ". . . . there is a definite order to all departments (meaning bureaus of the war department) under date of April 12 (1917) from the secretary of war . . . . . making plain that the desirability of clearing needed items with . . . . . the navy and the desirability of the several departments of the war department clearing with each other, would not relieve any department from acquiring what it needed for immediate purposes and wherever the time was not sufficient to allow it to clear, it could acquire its articles and it must proceed to acquire them. That is a military necessity."

The charge has been made that the war board has approved contracts for material at prices higher than the government could have obtained them without interference of the board. This is due, it is said, because of the elimination of bidding on advertised contracts. When the government buys without advertising and without consulting the board, the prices agreed upon are usually lower than they ordinarily would be, it is pointed out. This is because the manufacturers and contractors deal directly with the men they have always dealt with, and feel they will get credit for the reduction which, it is charged, the board now assumes in order "to make a showing."

The whole thing, summed up, is too many boards, committees, commissions without power, with over-lapping duties, and, in some cases, admittedly without definite knowledge as to how far they really can go.

Believe Naming of Steel Prices is Imminent

Washington, Sept. 18.—Prices for steel to be furnished the government will be named by the President in a very short time, possibly within the week. This is the only immediate thing that can be done to relieve the trade which is in great suspense and anxiety due to the government's delay on this important question. Even the fixing of prices at a low figure would be a big relief, but the general opinion here is that the prices will, in most cases, be satisfactory to iron and steel manufacturers and not as low as was expected.

Assurance of the early fixing of prices comes from a government official close to the situation. He would not admit openly that the President has had the data of the investigation of production costs with him on his yachting trip up the Atlantic, but the inferences from the official's attitude when questioned as to the truth in rumors on the subject give grounds for this conclusion. The grounds for the belief prices will be satisfactory have been pointed out in THE IRON TRADE REVIEW.

While the prices the President will

fix are not expected to apply to domestic consumers' and foreign governments' purchases, for the reason there is no power under law to compel such prices, it is becoming the belief here that prices slightly higher than those the government will pay will be voluntarily made to other than government buyers by the producers, in most cases. The President's appeal to the manufacturers' patriotism is expected to bring about such a situation.

The opinion that the President will fix the prices soon prevailed last week. The word "soon" was meant to be shortly after his return to Washington. It was said he would return last Wednesday, but when he didn't, the opinion still continued. Had he returned last Wednesday, many think the prices would have been set forth by the first of this week in a proclamation similar to that issued Saturday on sugar.

Government Moves to End Shortages of Coal

Washington, Sept. 18.—Manufacturers needing coal, whether for running plants engaged on either government or private contracts, should write or wire L. A. Snead or E. W. Parker, assistants to Fuel Administrator Garfield, 1023 Sixteenth street, Washington, D. C, Mr. Snead looks after the needs of bituminous users and Mr. Parker of anthracite. Mr. Snead is one of the directors of the Tidewater Coal Exchange and one of the commissioners selected by the coal operators to administer the government's fuel needs. He was selected by Dr. Garfield to handle the emergency needs of all bituminous consumers. Mr. Parker is a director of the Anthracite Bureau of Information, Wilkes Barre, Pa,, and was selected to assist anthracite users.

These men work in conjunction with Judge R. S. Lovett, of the war industries board, in charge of priority shipments. Judge Lovett last week modified his former order directing priority shipments of coal to the northwest, releasing slack coal held at Lake Erie ports to manufacturing and public utility plants which because of a shortage were obliged to shut down in some cases.

Dr. Garfield has announced he will supervise all coal export shipments, particularly into Canada where, it is claimed, much fuel intended for the northwest has been sent from lower lake ports. More than 30 per cent of the coal sent up the lakes between Aug. 24 and Sept. 6 went to Canada, it is claimed. Retail prices for coal will be tentatively fixed Oct. 1 if the coal investigation by the fuel administration is not completed by then. This will be followed later by the licensing of every dealer in the country. Violation of the license provisions will throw the dealer out of business and put the government in charge. Every contract in existence for supplying coal will be submitted to Dr. Garfield, and if he finds too much coal going to consumers when less will suffice, he will urge modification of the contract.

Building of New Airplane Motor is Started

Washington, Sept. 18.—Construction has begun on 4, 6, 8 and 12-cylinder engines, all of standard type, for the fleet of 20,000 airplanes America is to build for use against Germany. Parts of the engines are being made in dozens of factories and will be shipped to centralized plants for assembling in the units in which they will be employed under the $640,000,000 appropriation made by congress.

Secretary Baker, under whose department the airplanes will be built, announced last week that the type of engine had finally been approved and at the war department it was learned many of the completed planes will be ready by March 1. If the program goes through as planned, May 1 should see the machines flying over European battlefields. The aircraft production board of the council of national defense, headed by Howard Coffin, has filed with Mr. Baker a complete list of plants in this country equipped for the manufacture of parts which go to make up the new engine which has been called the "liberty motor". Whether all of these plants will be given work has not been announced, but it is presumed they will be if the fleet is to be built and put into service effectively.

The new engine is a composite type of European and American flying engines, put together by the combined efforts of more than a score of American consulting engineers, manufacturers and European aviation experts. Secretary Baker characterizes it as a great monument to American engineering ability and ingenuity.. It is powerful, speedy, light and serviceable. A remarkable feature in the construction of the engine is that on June 3 engineers held their first conference and discussed the question, and on July 3 the engine was set up ready for its first test, and on July 4 was in Washington running smoothly. It had been assembled from parts made in 12 different factories. Every part is standardized and will fit into engines of any of the four sizes to be built.

Ferro Shipments

From England Still Slumping Sharply —Manganese Ore Also Declining

Shipments of ferromanganese to this country from England have continued to fall off sharply and receipts now are one-half what they were a year ago. Imports for July of this year, just announced officially, were 2037 tons compared with 3817 tons in June and 5341 tons in July, 1916. Manganese ore arrivals also have continued to decline steadily. In July they amounted to 53,447 tons as compared with 62,778 tons in June and 81,942 tons in July, 1916.

The following table shows the comparisons of imports in gross tons of various ferroalloys for the period indicated:

			Seven months ending	
	July, 1917	July, 1916	July, 1917	July, 1916
Ferromanganese..	2,037	5,341	32,633	53,124
Ferrosilicon	702	487	6,233	4,042
Manganese ore..	53,437	81,942	370,227	318,965
Tungs. bear'g ore	251	508	2,449	2,518
Nickel, nickel oxide and matte	2,929	2,522	19,577	18,533

Westinghouse Will Build Malleable Foundry

To execute a government contract for supplying hand grenades, the Westinghouse Electric & Mfg. Co. has arranged to build a malleable iron foundry at its Cleveland plant. The new foundry is to be about 160 x 260 feet in size and is to be equipped with two 15-ton air furnaces. At present no equipment has been contracted for; but the company expects to place contracts soon. Prack & Perrine, Pittsburgh, have charge of the general engineering details of the new plant.

Will Make Gun Forgings

A contract for a heavy tonnage of 4-inch naval gun forgings has been awarded to the Tioga Steel & Iron Co., Philadelphia, by the navy bureau of ordnance. The contract covers both rough-machined and heat-treated forgings. A new forge shop and heat-treating plant, 120 x 280 feet, and a new machine shop, 90 x 240 feet, are being constructed to facilitate the production of government work. The Tioga company is a subsidiary of the Taylor-Wharton Iron & Steel Co., High Bridge, N. J. It is interesting to note that the Taylor-Wharton Co. is about to celebrate the twenty-fifth anniversary of the manufacture of manganese steel in the United States, the first of this alloy steel being made in the High Bridge plant.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

MAX McMURRAY, who has become the president of the Cromwell Steel Co., now building a new steel plant in Lorain, O., has been identified with important interests during his career as a pig iron and steel maker. His first connection with the steel business was with the South works of the Illinois Steel Co., Chicago, which began in October, 1890. Six years later, he was made assistant superintendent of the Joliet works of that company. In 1900, he was appointed general superintendent of the Newburgh works of the American Steel & Wire Co., at Cleveland. His association with M. A. Hanna & Co., Cleveland, as manager of blast furnaces, dates from 1904. The furnace properties of which he has been general manager are those of the United Iron & Steel Co., with plants at Leetonia and West Middlesex, Pa.; of the Detroit Iron & Steel Co., and of the Penn Iron & Coal Co., with a furnace at Canal Dover, O. He also has been serving as vice president of the United Iron & Steel Co., and of the Penn Iron & Coal Co., and as secretary and treasurer of the Detroit Iron & Steel Co. Mr. McMurray is a native of Toronto, Canada.

H. E. Derbyshire has resigned as general manager of the Chambersburg Engineering Co., Chambersburg, Pa. His resignation was effective Sept. 10.

Roscoe P. Ham, for 30 years city editor of the *Bath Daily Times,* Bath, Me., has been appointed welfare manager of the Bath Iron Works, Bath, Me.

Wm. J. Kihm has resigned as foundry superintendent of the Gurney Electric Elevator Co., Honesdale, Pa., to accept a similar position with the Modern Foundry Co., Cincinnati.

Arthur C. Sullivan, formerly with the Hensley Trolley Mfg. Co., Detroit, Mich., has been made sales representative at Chicago for the National Railway Appliance Co. of New York.

William G. Crommett, Chelsea, Mass., for the past two and one-half years as outside salesman for the Edison Electric Illuminating Co., Boston, has been appointed assistant correspondence supervisor of the Norton Co., Worcester, Mass.

John Statz, who for many years was master mechanic at the north works of the American Steel & Wire Co., at Worcester, Mass., has succeeded John B. Carroll, deceased, as master mechanic of the south works of that company.

A. E. Heffelfinger has been made chief engineer of the National Steel Car Co., Ltd., Hamilton, Ont. He had been chief draftsman. He formerly was connected with the Harlan & Hollingsworth Corp., the Pressed Steel Car Co. and the American Car & Foundry Co.

MAX McMURRAY,
Who Has Become President of the Cromwell Steel Co.

Edward Lurker, formerly engineer of the Haynes Stellite Co., Kokomo, Ind., has been named district sales manager with offices at Chicago. Mr. Lurker will have charge of the territory comprising Wisconsin, Iowa, Minnesota and Illinois.

Charles E. Davis, president of the Pennsylvania Forge Co., was the speaker at the weekly luncheon of the Rotary club, Philadelphia, Sept. 12. He traced the history of steel forging to the earliest times and explained in detail modern forging methods.

Edgar Allen Custer, of Philadelphia, who has developed a permanent mold for producing castings without the use of sand, to a high state of perfection, has been assigned by the United States government to the munitions inspection department with the rank of major.

R. F. Williams, formerly connected with Manning, Maxwell & Moore, at Pittsburgh, has become associated with the sales department of the Sherritt & Stoer Co., Inc., 603 Finance building, Philadelphia, dealers in machine tools and equipment. He will make his headquarters in Philadelphia.

Dr. W. Irving Clark, chief surgeon of the Norton hospital and head of the health and sanitation department of the Norton Co., and Norton Grinding Co., Worcester, Mass., has sailed for Paris, having been appointed on the medical staff of the American Red Cross Unit.

Chester H. Lehman, secretary and director of the Blaw-Knox Co., Pittsburgh, has entered the service of the United States government as first lieutenant in the ordnance department. Mr. Lehman graduated from Harvard in 1909. He has been secretary and director of the Blaw-Knox Co. for the past six years.

S. S. Freeman has resigned as general manager of the Carbon Iron & Steel Co., Parryville, Pa., but will continue in control of the company's plant until relieved. In the meantime he has been elected secretary and treasurer of the Port Henry Iron Ore Co. and the Lake Champlain & Moriah Railroad Co.

W. A. Janssen, who recently resigned as superintendent of the plant of the Bettendorf Co., Bettendorf, Ia., has been appointed operating manager of the plants of the Canadian Steel Foundries, Ltd., Montreal, located at Longue Pointe and Pointe St. Charles, Quebec, and the steel foundry and rolling mill at Welland, Ont.

Norman L. Warford, mechanical engineer, in charge of construction for the Powdered Coal Engineering & Equipment Co., Chicago, sailed from New York recently to take up his new duties as engineer in charge of the coal pulverizing and copper smelting department of the Societe des Mines de Cuivre de Catemou at Catemou, Chile. Mr.

Warford has had many years' experience in the use of powdered fuel and was the designer and first operating superintendent of the installation of the Anaconda Copper Mining Co., at Anaconda, Mont.

Macklin Cunningham, assistant treasurer of the Torrington Mfg. Co., Torrington, Conn., has resigned to enlist in the army, after having been exempted for industrial reasons.

Eugene Kelly, assistant secretary of the Syracuse Smelting Works, Brooklyn, has taken full charge and management of the Chicago office of that company.

Perley R. Prescott, consulting engineer for the Erie Iron works, Erie, Pa., will sail for Japan, Oct. 12, to be employed by the American Trading Co. in installing engineering plants in that country.

H. J. Richardson, formerly connected with the Commonwealth Edison Co., Chicago, and more recently with the ordnance department of the Crucible Steel Co., Harrison, N. J., and the New England Westinghouse Co., has been appointed works manager of the Berger Mfg. Co., Canton, O. He will have charge of the power plant, new construction and maintenance and repair or equipment and buildings.

Norman R. McLure, formerly chief engineer of the Phoenix Iron Co., Phoenixville, Pa., has resigned to assist in directing the construction of the additions to the plant of the Tioga Steel & Iron Co., Philadelphia, a subsidiary of the Taylor-Wharton Iron & Steel Co., and subsequently to assist in supervising plant production. The Tioga plant is to execute an ordnance contract for the navy department.

Women Do Foundry Work

Women are being employed at the Wilmington, Del., plant of the Eastern Malleable Iron Co. to perform the lighter branches of labor formerly done by male employes. The new workers, who wear uniforms of khaki with blouse and bloomers, have proved as competent in some departments as the men.

The strike of puddlers at the plants of the Reading Iron Co., Reading, Pa., now has been in progress for a month and there is no sign of settlement. Some of the departments of the company have been closed down and the output has been curtailed. The puddlers have been receiving $9.75 a ton and the company offered them $10.50, but they demand $11.50.

Furnaces Fail to Report

Many Companies Negligent in Furnishing Raw Material Data to War Committee, Thereby Delaying Efficient Distribution

PITTSBURGH, Sept. 18.—Despite the efforts of the committee on lake coal and ore movement, council of national defense, to have blast furnace companies throughout the country report weekly complete data regarding the sources of supplies of their raw materials and the causes of any shortage, the results being obtained are not satisfactory. The committee is working earnestly to get this information in order to submit it to the government and to arrange equitable distribution of cars and supplies of raw materials for the blast furnaces. It is imperative that this be done not only for the benefit of the pig iron producers, but also to stimulate production to the highest point possible for the welfare of the nation in connection with its war needs.

In the absence of all the information desired, the committee continues to be in doubt as to what the furnaces need in the way of raw materials and where the latter come from. So long as the present situation exists, it is not possible, for instance, for the war industries board, of which Judge Robert S. Lovett is chairman, to modify the priority order regarding preferential shipments of lake coal. This order has been the cause of much concern by blast furnace operators and has resulted in some of them suffering from such a shortage of fuel that they have been compelled to bank their furnaces, while others are on the verge of having to pursue a similar course. It, therefore, remains for the furnace interests themselves to co-operate with the committee on lake coal and ore movement, of which George L. Peck, 903 Pennsylvania station, Pittsburgh, is chairman, to obtain relief

Reports made to the committee show that particularly blast furnaces which are self contained, that is, those receiving all the raw materials they require, are failing to furnish the committee with the desired information. It has been pointed out emphatically that it is just as necessary that these furnaces provide the committee with the information wanted as it is for furnaces which are not getting adequate supplies of raw materials.

For the week ending Sept. 8, the committee received reports from only 269 coke and anthracite stacks out of a total of 410, which have been requested to submit data to it, leaving 141 stacks, or 35 per cent, which did not report. Many of the non-reporting stacks have been idle for years. Of the 269 stacks, or 65 per cent reporting, 106 stacks, or 40 per cent of those sending in information, are those of the United States Steel Corp. The situation is aggravated further by a reason of the fact that some of the stacks, while sending in reports, supplied information that is entirely inadequate.

In so far as the number reporting is concerned, the best showing was made by the Pittsburgh district. Of the total of 57 stacks in that district asked to report, 54 did so. However, some of the reports coming from this district were incomplete and, therefore, unsatisfactory. The Hanging Rock district of Ohio made the worse showing in the matter of the number of reports sent in. Of the 15 stacks asked to report from that district, only three did so.

The following table gives a summary of reports of stacks throughout the country for the week ending Sept. 8 and also shows the number failing to make reports:

District:	Stacks reporting	Stacks not reporting	Total	Average weekly capacity, tons	Week's output, tons
New York and New Jersey	21	10	31	49,670	39,991
Lehigh Valley, Pa.	15	1	16	26,785	24,292
Schuylkill Valley, Pa.	8	5	13	22,250	17,122
Lower Susquehanna and Lebanon Valleys, Pa.	7	11	18	13,600	12,641
Pittsburgh district	54	3	57	*	*
Shenango Valley, Pa.	12	7	19	*	*
Western Pa.	15	13	28	41,849	37,832
Virginia, Kentucky and Maryland	16	12	28	*	*
Wheeling district	11	3	14	29,568	20,840
Mahoning Valley, Ohio	25	1	26	75,858	62,608
Central and Northern Ohio	22	5	27	61,342	*
Hanging Rock Region, Ohio	3	12	15	4,375	3,173
Chicago district	37	8	45	121,227	106,955
Minnesota, Missouri, Michigan, Colorado and Washington	4	11	15	7,030	6,440
Alabama, Tennessee, Georgia and Texas	19	39	58	24,926	22,026
Total	269	141	410	.....	.....

*Incomplete.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted for Busy Readers

Huge War Financing Sobers Business

WAR financing and its influences have come to the fore as points of dominating influence in business circles. Last week, the war credits bill, authorizing new bonds and certificates aggregating $11,538,000,000—the largest measure of its kind in the world's history—was passed by the senate without dissenting vote. It already had passed the house and went into conference this week. As passed, the measure provides for an issue of $7,538,945,460 of 4 per cent convertible bonds, subject to war supertaxes and profits taxes, to terminate at the discretion of the secretary of treasury. The bill also provides for an issue of not more than $2,000,000,000 of certificates of indebtedness and an equal issue of war savings certificates, which also will bear 4 per cent interest.

Judge Elbert H. Gary, chairman of the United States Steel Corp., on his return from a six weeks' trip to Alaska, was asked for his opinion on the Washington estimate that the conflict would cost the United States $18,000,000,000 this year. He replied that it must be remembered that a large part of the expected outlay could not be looked upon as money merely spent. "A large part, probably $5,000,000,000, will be in loans to our allies," said Judge Gary, "while many millions will go toward shipbuilding, the erection of fortifications and other permanent work. The costs of these are really permanent charges and not running expenses of the war."

While it is comforting to realize that a large part of the $18,000,000,000 of 1917 war expenditures is not to be fired through the cannon's mouth or otherwise irreparably lost, the necessity for raising money to meet current war requirements is making itself felt in the financial markets. Call money rates are firm at 5 per cent; time money is at 5 to 6 per cent. Declining stock prices are reflecting the shadows cast before, by the coming government bond flotations.

Charles H. Sabin, president of the Guaranty Trust Co., New York City, suggests that a federal commission be formed to pass upon the priority of public security offerings, in order that the government may have the right of way in financing the war. Said Mr. Sabin:

"To meet the pressing demands of the war the government should have the right of way of its demands for labor, capital and materials; and everything possible which means competition with these demands should be eliminated or at least postponed. The country's business today is war, and every proposition should be measured by the standards of its necessities. Only as its successful prosecution is furthered, can any venture be justified. Both public and private needs and undertakings which are not absolutely essential should be held in abeyance, and no new financing encouraged which does not meet an absolute and immediate need."

When a plan for taxing profits finally is adopted, one of the factors now repressing trade will be removed. But the agitation for price fixing continues the biggest factor of all in the present policy of business "marking time."

Canadian Locomotive Has Best Earning Year

Kingston, Ont., Sept. 17.—The Canadian Locomotive Co., Ltd., during the 12 months ended June 30, last, enjoyed the largest earnings in its history, most of which were derived from locomotives and locomotive parts and not from munitions. Aemilius Jarvis, president of the company, stated that fully 75 per cent of the revenue came from the former source. The company at present is under contract to build 86 locomotives. Manufacturing profits during the year totaled $721,254, and net profits $616,254. With a balance of $304,322 from last year, this gave $920,577 available for distribution. Out of this $105,000 went to preferred dividends, $25,000 was transferred to reserve for special replacements, $100,000 to reserve for general depreciation and $15,000 was added to the sinking fund. The balance carried forward to the current year was $690,577. The net profits are equivalent to more than 17.6 per cent on the issued capital, or over 25 per cent on the common. Net profits on the year's business amounted to 25.6 per cent in excess of those of any previous year. Contracts on hand amount to $3,925,400 for locomotives and locomotive parts and to $199,600 for munitions.

New $30,000,000 Bethlehem Issue is Approved

Stockholders of the Bethlehem Steel Corp. have approved the proposal to issue $30,000,000 of new 8 per cent preferred stock and an increase of $30,000,000 in class B stock to provide for conversion of the preferred. This action was taken at a special meeting at Newark, N. J., Sept. 14. Excepting 200 shares of preferred and 100 of common held by Clarence H. Venner and his associates who had tried unsuccessfully to enjoin the plan all the stockholders voted in the affirmative. The vote to increase the capital stock was preceded by a decision of Vice Chancellor Lane at Newark dismissing the bill of complaint brought by Venner and his associates. The court in its opinion referred to Venner as "a professional privateer". Counsel for the General Investment Co., of which Venner is the head, is taking the case before the court of errors and appeals at Trenton.

Join Vulcan Steel Board

Gen. T. C. du Pont, Frank H. Hitchcock, formerly postmaster general, and L. W. Baldwin, of the Empire Trust Co., New York, have joined the directorate of the Vulcan Steel Products Co., 120 Broadway, New York. Mr. Hitchcock has become actively associated with the organization as vice president. Otto Kafka, the founder of the company, remains its president and directing officer. The Vulcan Steel Products Co. was incorporated in New York state Sept. 27, 1916, with a capital stock of $100,000, of which $10,000 was paid in. The business was begun in a two-office suite. Later the working

capital was increased to $22,000. The business now occupies more than 30 offices, has employes numbering more than 150 and has agents and representatives in leading market points throughout the world. The company is doing a large volume of business in iron and steel and associated products.

Orders Arms Plant Sold to Complete Contract

The sale of the Hopkins & Allen Arms Co., Norwich, Conn., by the receivers, has been ordered by Judge Edwin S. Thomas of the United States court, to satisfy a mortgage debt of $3,850,000 owed to the Belgian government. The Belgian government, which placed a contract with the company for 150,000 mauser rifles at $27 each, the low price of which was the cause of the financial crash, has expressed its willingness to advance $2,000,000 to complete the contract. The United States government wants machine guns made from the plant. Plans have been made whereby the Belgian government will turn over the entire plant to the Marlin-Rockwell Corp., New Haven, Conn., in case the sale is made. If the latter purchases the property, it will finish the Belgian rifles at $42.30 each and make machine guns for both the United States government and the allies.

Takes Over Plants

The Torrington Co., Torrington, Conn., has taken over the plants of the Excelsior Needle Co., Springfield, Mass., and Chicopee, Mass. Both plants will be operated as branches; but all manufacturing will be done at the Chicopee plant. The Torrington Co., which formerly was a holding company, now becomes an operating company through a complete reorganization of its subsidiaries in New England.

Financing Plant Project

Texas City, Texas, Sept. 17.—At a recent meeting of the stockholders of the Texas Resourses Development Co., held at Houston, it was shown that the corporation is now amply financed to carry out its plans for the construction of a large iron and steel plant here and for the development of about 10,000 acres of iron ore land which it owns in east Texas. This company recently increased its capital stock from $4,000,000 to $6,000,000 and for some time has been retiring bonds and issuing stock certificates in their place. The company's subsidiaries include the Texas City Street Railway Co., the Texas City Electric Light & Power Co., the Texas City Sewer Co., and the Passenger Pier Co. The principal stockholders of the Texas Resources Development Co. are A. B. Wolvin, of Duluth, Minn.; Henry H. Dickson, J. M. West, R. S. Sterling and John H. Kirby, all of Houston. At a meeting of the directors the election of president was deferred until some future time. Henry H. Dickson was elected first vice president; J. H. W. Steel, second vice president; H. A. Thomas of Texas City, third vice president; and R. M. Orth, secretary.

Financial Crop Ends

At the annual meeting of the Standard Foundry Co., held last week at New Kensington, Pa., the following officers were elected: President, C. A. Loughman; vice president, D. M. McBride; treasurer, W. G. Kenney. The officers together with John DuRoth and George M. Evans were chosen as directors.

* * *

Receivers have been appointed by the Rhode Island superior court for the Metal Products Corp., Providence, R. I., on the application of Harry M. Mays, Warwick, R. I., who holds a majority of the stock. The corporation has $175,000 common stock outstanding. It is expected the creditors will be paid in full.

* * *

Stockholders of the Petroleum Iron Works Co., Sharon, Pa., and its associated companies, the Pennsylvania Tank Car Co. and the Pressed Steel Products Co., have unanimously reelected all of their officers. The presidents of the three companies, in the respective order named, are G. B. Bard, L. F. Jordon and John H. Consindine.

* * *

The stockholders of the Boston Belting Co., Boston, have voted to accept an offer made by Willett, Sears & Co., of that city to purchase all of the assets at a net price equivalent to $132.50 a share, of which $82.50 will be in cash and $50 in preferred stock of a new Boston Belting Corp., to be organized under the laws of Massachusetts.

* * *

Judge R. M. Addleman in circuit court at Wheeling, W. Va., has handed down a decree directing the sale of J. V. Thompson's undivided 83-288 interest in a tract of Richland district coal, aggregating 5,464.55 acres, underlying 5,985.62 acres of surface. In another decree handed down at the same time, Judge Addleman establishes a claim of $11,716.80 in the suit of R. E. Talbott and J. E. Barnes.

* * *

Reorganization of the plow manufacturing department of the William J. Oliver Co., Knoxville, Tenn., now an independent corporation, is under way. Knoxville capitalists will be associated with Mr. Oliver in this plan. The munitions plant, car manufacturing and repair shops will be continued as heretofore. The Oliver company is arranging to enter into the manufacture of farm tractors of a type recently developed.

Phenol Inquiry

Grows Considerably as Prices Firm—Solvent Naphtha is More Active

New York, Sept. 15.—With the stronger price trend, inquiry for phenol greatly has increased during the week. Domestic consumers are out for large quantities for forward delivery and there is big demand from abroad for spot. Business actually closed during the week embraced principally spot averaging 42 to 43 cents per pound, at producer's plant. Makers are disinclined to accept below 42 cents for contracts.

Benzol sales were fair. Both spot and contract were sold for foreign and domestic consumption. The business done was done slightly lower than a week ago. Pure benzol may be quoted at 53 to 58 cents per gallon at producer's plant for spot, and at 53 to 55 cents for contract. Ninety per cent benzol is quoted at about 5 points below the prices for pure benzol. A fair amount of inquiry is current. In toluol, the situation is entirely unchanged. Makers are confronted with a huge demand, which in view of their sold up condition, they are unable to satisfy. Business during the week involved only a few spot carloads, at $1.70 to $1.80 per gallon, at producer's plant. Contract toluol still is quoted nominally at $1.50 to $1.80 per gallon.

More life has been reflected in solvent naphtha than for a long time past. At least three contracts were closed, involving in excess of 20,000 gallons each. These went at prices ranging from 15 to 20 cents per gallon. The market, however, can be indicated by a narrower range of from 16 to 18 cents.

Unfilled requirements of sulphate of ammonia continue large, but the output has been sold up.

Coke Oven By-Products

Spot

Per Gallon at Producers Plant	
Pure benzol	$0.53 to .58
Toluol	1.70 to 1.80
Solvent naphtha	.16 to .18
Per Pound at Producers Plant	
Phenol	$0.42 to .43
Per 100 Pounds at Seaboard	
Sulphate of ammonia	$4.85 to 5.00

Contract

Per Gallon at Producers Plant	
Pure benzol	$0.53 to .55
Toluol	1.50 to 1.80
Solvent naphtha	.16 to .18
Per Pound at Producers Plant	
Phenol (nominal)	$0.42
Per 100 Pounds at Seaboard	
Sulphate of ammonia	nominal

Government Asks For Many Tools

Representatives of One Hundred Machine Tool Dealers Answer Summons to Quote on $2,000,000 List to Fill Nation's Equipment Needs for Liberty Motor Plant Soon to be Established in France

UNITED STATES government works in France, including unloading terminals, ordnance base depot, railroad facilities and an airplane engine plant, are commanding much attention in the machinery market. A bomb was thrown into the machine tool trade last week when most of the country's builders received telegrams from the J. G. White Engineering Co., 43 Exchange place, New York, to send representatives to its offices in connection with securing equipment for a government plant in France, where the "Liberty" motor will be built. Nearly 100 machine tool men assembled at the offices of the J. G. White Co. and carefully prepared lists of tools, to cost probably between $2,000,000 and $3,000,000 were shown. The machinery men were asked to specify then and there as to what tools they could accept, with prices and deliveries. It was desired that deliveries be made in 30 days. It is estimated that if this and other airplane engine projects now pending are consummated, deliveries on many types of tools, including even smaller sizes of boring mills, milling machines and grinders will be pushed six months further ahead. The J. G. White Co. also is drawing plans for a $4,000,000 nitrate plant for the government. The Stone & Webster Engineering Corp., 147 Milk street, Boston, is endeavoring to close as soon as possible on the long list of equipment for an ordnance base depot in France, as noted in THE IRON TRADE REVIEW last week. The General Vehicle Co., Long Island City, has not yet closed on its tool requirements, estimated at $1,000,000 for a plant to build a French type of airplane engine. The Simplex Automobile Co., New Brunswick, N. J., has not yet acted on its requirements of about 200 machines for an airplane engine plant. These companies are not issuing lists but are notifying builders as to their needs in the lines made by the respective builders.

Government Makes Big Crane Allotment

The government has distributed orders for 80 locomotive cranes for unloading terminals in French ports. Orders have been placed for many locomotive cranes in the past few weeks, until now deliveries are practically unobtainable in less than four months and from some builders in less than six to nine months. The Norfolk & Western railroad is in the market for two 20-ton locomotive cranes, on which it wants speedy delivery and is willing to take second-hand equipment. The Worthington Pump & Machinery Corp. is reported to have placed one 10-ton and three 5-ton electric cranes with the Pawling & Harnischfeger Co., Milwaukee. The Tacony Ordnance Corp., Philadelphia, has revised the specifications on the list of the cranes it recently issued, now asking for 14 traveling cranes, of which one is to be 60-ton, one 30-ton, one 25-ton, two 15-ton, five 10-ton and four 5-ton cranes. The William Cramp & Sons Ship & Engine Building Co. has not yet closed on the list of 10 electric cranes for which it recently inquired. The Federal Shipbuilding Co., subsidiary of the United States Steel Corp., building a plant in Newark bay, has closed for much shipyard equipment, but has not yet sent out a general inquiry for cranes. The American International Corp. officially announces it has signed a contract with the government for construction of a yard at Hog Island, Pa. Further information concerning this undertaking will be forthcoming from the Emergency Fleet Corp. The Submarine Boat Co. also has received its contract for a yard in Newark Meadows. In a short time these interests will be active in the equipment market. The Merchant Shipbuilding Corp., which also has received a contract to build a shipyard for the government at Bristol, Pa., has closed on much of the equipment it will need, but still is figuring actively on several cranes.

Purchases Cranes on Cost-Plus Basis

An interesting feature of the crane market relates to contracts placed by the government. These orders usually are placed on a cost plus 10 per cent basis. In some, if not all cases of direct government crane buying, the crane builder figures his costs on the basis of what he has to pay for raw material. Having bought the material he turns his invoices over to the government, which collects from the steel producer the difference between the cost of the steel to the builder and a price which the government has fixed on such business, say 2.50c for shapes and 3.50c for plates. Such a saving would amount to little in the case of standard types of locomotive cranes, where machining is the largest item, but on electric cranes and crane runways the saving to the government might be considerable.

Temporary Lull Prevails in Chicago

SOMEWHAT lighter demand for machine tools is being experienced by Chicago dealers; however this is regarded as only a temporary condition. Compared with August, the business done so far in September is considerably less in the experience of most dealers. Buyers of single tools and small lots seem to have left the market for the present. Some activity is shown in certain lines of second hand tools, while other lines are without demand. The Rock Island arsenal has distributed a generous lot of business among Chicago dealers, including millers, boring machines and general shop equipment. The best delivery on most of this equipment is January, 1918. The Chicago & Alton railroad probably will close soon on a list of about 12 tools for which inquiry was sent out in July. Fairbanks, Morse & Co. are inquiring for about 20 tools, including six lathes, drill presses, boring bars, and other tools. The Illinois Central railroad probably will issue a list shortly for a small amount of equipment. An engine builder at Rock Island recently purchased a small list of tools. An incident of the past few days has been the presence in the Chicago market of a buyer from Mexico with an unusually large list of requirements. Up to this time nothing has been done with this business. The Chicago Union Specialty Machine Co. is having

AGATHON ALLOY STEELS

"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Vanadium
"AGATHON" Chrome Steel
"AGATHON" High Carbon
"AGATHON" Special Analyses

Here's a "knotty" problem in alloy steel manufacture, and a knot which would defy alike the skill of Gordius to tie, and the sword of Alexander to sever.

This test was made on a piece of one and one-half inch round AGATHON Chrome Vanadium Steel selected at random, the stock being bent and knotted while cold without showing any sign of fracture.

The rule included in the photograph shows how small the knot actually was.

The Central Steel Company
Massillon, Ohio

Detroit Office: 326-27-28 Ford Bldg.
F. Walter Guibert, District Representative

Cleveland Office: Hickox Bldg.
The Hamill-Hickox Company, District Representatives

Chicago Office: 1370 People's Gas Building—112 South Michigan Blvd.
A. Shaeffer, District Sales Manager

Philadelphia Office: 603 Widener Building
Frank Wallace, District Sales Manager

J. E. Dockendorff & Co., 20 Broad St., New York, General Export Agents

AGATHON STEELS
TRADE MARK

Say you saw it in THE IRON TRADE REVIEW

plans drawn for an eight-story factory. The Galesburg Machine Works, Galesburg, Ill., is building a machine shop. The Titan Truck & Tractor Co. is preparing to build a plant at Milwaukee. The E. B. Hayes Axle Co. will build a plant at Grand Rapids, Mich. The Wisconsin Engine & Dynamo Co. of Milwaukee has plans under way for a plant. The Anderson Forge & Machine Shop at Detroit is adding to its forge and die shop. The Muskegon Valve Co. at Muskegon, Mich., is building a plant. The Markey Campbell Machinery Co., Seattle, will build a machine shop.

Market Works on Government Requirements

GOVERNMENT needs evidenced in the requirements of makers of war materials as specifically shown in inquiries have supplied the outstanding feature of the past week in the Cleveland machine tool market. A proportionally larger demand for planers and vertical boring mills than for other machine tools not so directly connected with the production of guns is typical of the enlarged demand. Several makers of airplanes, who previously issued lists, have decided to temporarily suspend any definite action pending word from the government as to whether it will purchase motors or airplanes built according to private designs. Other than business allied with war activities, the machine tool market has been listless, with about the usual number of inquiries for small tools, from widely separated sources. Dealers are optimistic, however, in that a better demand is expected shortly. An average increase of 10 per cent in prices has been announced by one dealer affecting electric drills, tinner's equipment and lathes. The Cross Gear & Engine Co., Detroit, has issued an inquiry for a gear hobber. The American Foundry & Construction Co., Pittsburgh, is in the market for a 4-foot motor-driven, radial drill. Machine tools, both new and used, have been offered for sale by the Wilcox Motor & Mfg. Co., Saginaw, Mich. The American Auto Trimming Co. has purchased a 2-acre site and is having plans prepared for a factory. A permit has been taken out by the Westinghouse Electric & Mfg. Co. for a 165 x 241-foot malleable iron foundry. The National Malleable Castings Co. has awarded a contract for shop extensions to include a machine shop.

Government's Needs Feature Market

GOVERNMENT requirements continue to dominate the market in this district for machinery and machine tools. It is understood that some large orders for equipment for making munitions are about to be let by the government, some of them for shipment to France. Private buying is almost entirely lacking and is not expected to develop until the present unsettled state of the market has given way to one of certainty. Buyers are coming into the market only in cases of pressing necessities, feeling that after the government has announced its price fixing policy that contracts can be closed at lower levels and better knowledge as to time of deliveries will be in their possession. No immediate prospects for a betterment are in evidence.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Among New England Factories

COOPER, ME.—H. S. Predmore and A. S. Gunn, New York, have purchased the property of the United States Molybdenum Co., and will build a 500-ton mill to take the place of the 20-ton mill that has been operated thus far.

KITTERY, ME.—The Maritime Equipment Co. has been incorporated to make locomotives, engines and derricks with $10,000 capital by Horace Mitchell and H. A. Paul.

PORTLAND, ME.—The Air Device Co. has been incorporated to make machine and automobile parts, equipment and metal specialties with $175,000 capital by A. B. Farnham, P. B. Drew, and T. L. Croteau.

BOSTON. — The Trimont Mfg. Co. will build a 3-story plant addition, 46 x 85 feet to cost about $10,000.

BOSTON. — The Federal Stoker Co. has been incorporated with $100,000 capital by John J. Hammers, Albert H. Wright and David A. Hincks.

HINGHAM, MASS. — The Kennedy & Peterson Construction Co., Boston, has been awarded the contract at $109,800 for two additional storage buildings for the government at the naval magazine.

HOLYOKE, MASS.—The Wells Hardware Co. has been incorporated with $21,000 capital by Frank Rainault, Edward V. Rainault and L. B. Krause.

HOLYOKE, MASS. — The Deane Steam Pump Works, 37 Appleton street, has started construction work on a 1-story plant addition, 150 x 165 feet to cost $50,000.

LOWELL, MASS. — The Donnelly Iron Works has been incorporated with $10,000 capital by Frank A. Donnelly and Frederick B. Emerson.

MALDEN, MASS.—The John K. Wells & Son Co. has been incorporated to make sheet metal with $25,000 capital by Fred E. Wells, John K. Wells and M. G. Gray, Cambridge, Mass.

TAUNTON, MASS.—The North Dighton Stove Co. has been incorporated with $40,800 capital by Daniel Crotty, John P. Dary, and Henry H. Lincoln.

WEBSTER, MASS.—The Webster Dye & Yarn Works which recently was incorporated with $75,000 capital by Prentiss Howard, Henry J. Steinberg and George R. Coster, has let the contract for a brick, 3-story, 65 x 75-foot mill on Deslauriers avenue.

WORCESTER, MASS. — The American Steel & Wire Co. will erect a brick, mill construction, 1-story addition to building 202 at its south works to cost about $30,000.

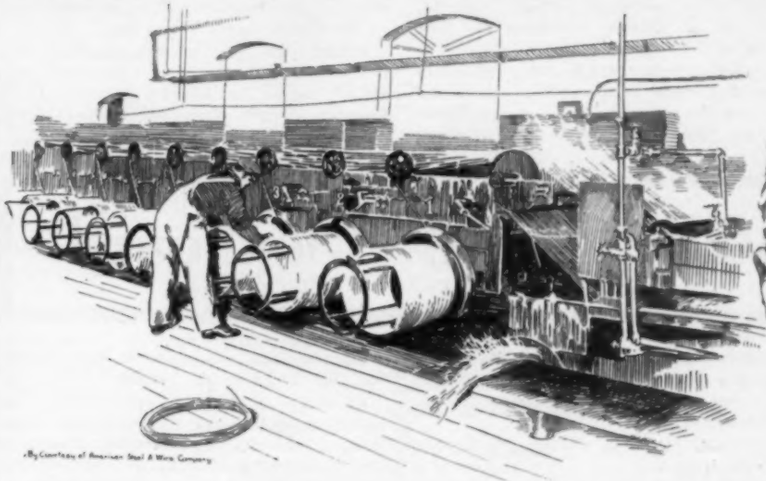
PAWTUCKET, R. I.—The Johnston Machine Co. will build a 2-story machine shop, 84 x 290 feet, to cost $6500. James C. Potter is president.

PROVIDENCE, R. I.—The Fuller Iron Works has had plans drawn for a 1-story plant addition to be 20 x 50 feet.

PROVIDENCE, R. I. — The Universal Plate & Wire Co. has been incorporated with $100,000 capital by Charles C. Mumford, George H. Huddy Jr., and E. Butler Moulton.

CROWELL, CONN.—The Connecticut Power Co., New London, will build an electric power station. The Stone & Webster Engineering Corp., 147 Milk street, Boston, has the general contract.

HARTFORD, CONN. — The Standard Oil Co. will build a steel and concrete 2-story and basement, 50 x 100-foot warehouse and



Who's Who in Fedex

It's the man-power that counts biggest in the success of any organization and, as Fedex holds such close relations with its clients, we believe that those manufacturers who will eventually use its services will be interested now in knowing the men who manage its various affairs.

FRED L. WATSON

For eighteen years Treasurer of the American Steel & Wire Company, and since 1888 directly associated with the financial developments of the steel industry. Now financial adviser of the Federal Export Corporation and actively engaged in directing its domestic connections.

The services of Fedex cover such an extensive field in its overseas selling that it requires a large staff of men versed in the many special branches of exporting. Some of these men are widely known in the steel and allied industries, while others, who have specialized in export selling, may not be known to you. Every man in the organization has been selected because his knowledge and experience fits him to make Fedex more efficient in the sale of American products overseas.

If you Fedex your line you will come in frequent touch with these men, for they will work with you in your foreign trade as intimately as your own sales force does in this country.

One of our sales staff who has had experience in exporting goods in your line will gladly explain, by letter or interview, how Fedex can serve you in preparing for a permanent foreign trade "after the war."

FEDERAL EXPORT CORPORATION

115 BROADWAY - - - - NEW YORK

other buildings and tanks for a central distributing station.

NEW HAVEN, CONN. — The Thompson-Starrett Co., New York, has been awarded the contract to build a brick, 2-story, 90 x 300-foot station for the N. Y., N. H. & H. railroad.

NEW LONDON, CONN.—T. A. Scott has been awarded the contract by the government for a reinforced concrete, fireproof, 4-story, 68 x 120-foot storehouse to cost $125,000 at the submarine base.

SOUTHINGTON, CONN. — The Harriman Motors Co., South Glastonbury, Conn., has taken over the vacant buildings of the Barnes & Cobert Mfg. Co., to make 1200 airplanes for the government. The South Glastonbury plant of the company will be abandoned and all machinery and tools removed.

STAMFORD, CONN.—The Stamford Electric & Mfg. Co. has been incorporated with $50,100 capital by Edward Heitman, E. B. Heitman, Andrew Baile and John D. Baile, Montreal.

Along the Middle Atlantic Seaboard

ALBANY, N. Y.—Lathrop, Shea & Henwood, Ellicott square, Buffalo, have been awarded the contract for building a bridge over lock 27, Clyde river, barge canal, at the contract price of $68,770.

AUBURN, N. Y.—The McIntosh, Seymour Co. plans to erect a factory addition and erecting shop. A. C. Baldwin has charge.

BUFFALO.—The Buffalo Truck & Tractor Co, has been chartered with $150,000 capital to make motors, trucks, etc. E. H. Oversmith, G. B. Burd and S. B. Simpkins, are the incorporators.

BUFFALO.—The New York Central railroad plans to erect a reinforced concrete freight terminal, 60 x 500 feet, at Curtiss and Clark streets, to cost about $250,000. G. W. Kittredge, Grand Central terminal, New York, is in charge of the work.

COHOES, N. Y.—The board of education has awarded the Schaefer Construction Co., 5 West Thirty-first street, New York, a contract to erect a 2-story high school, 60 x 150 feet, to cost $120,000.

JAMESTOWN, N. Y. — The Art Metal Construction Co. has awarded the general contract for plant alterations at its No. 1 shop to the Warren Construction Co.

NEW YORK.—Joseph Stern & Co. will build a coal pocket and boiler house extension at 630 West Fortieth street.

NEW YORK.—The R. & L. Bearings Co., has been incorporated with $10,000 capital to manufacture journal bearings and all kinds of machinery. The incorporators are: P. B. Rose, L. L. Lichstenstadter and L. Biel, 885 West End avenue.

RICHMOND HILL, L. I.—The Keiner-Williams Stamp Co. will build a 1-story plant addition, 100 x 153 feet, to cost $22,000.

SYRACUSE, N. Y.—The Continental Can Co. will build a $50,000 plant. Thompson & Binger, Inc., 280 Madison avenue, New York, have the contract for building.

ALLENTOWN, PA.—The Bethlehem bridge commission is contemplating the construction of a bridge which involves an outlay of approximately $2,000,000.

CHESTER, PA.—The Chester Shipbuilding Co. is receiving bids on the construction of a new 2-story punch shop to be erected at the foot of Kerlin street.

DRAVOSBURG, PA.—The board of education has awarded J. G. Fullman, East End Trust building, Philadelphia, a contract to erect a 2-story high school, to cost about $70,000.

NEW CASTLE, PA. — The New Castle Mining & Clay Products Co. has been incorporated with a capital of $60,000 by Charles W. Rhodes, Charles H. Andrews, Fred L. Rentz, John A. Butler, E. W. Beadle, M. A. McLure and George T. Weingartner.

PHILADELPHIA. — A permit has been granted to William Steele & Son Co. for the erection of a 5-story, 44 x 122-foot addition to the plant of the Lanston Monotype Co. at 25 and Locust streets.

PITTSBURGH.—The Pittsburgh Knife & Forge Co. has purchased a site at Forty-seventh and Harrison streets to extend its plant.

PITTSBURGH.—W. H. Fissell, 1328 Broadway, New York, has awarded J. A. Wetmore, supervising architect, treasury department, a contract to remodel the post office, at a cost of $110,000.

POTTSTOWN, PA.—The Bramcote Foundry & Machine Co. is enlarging its plant. Excavations now are under way for a new 120 x 148-foot machine shop and a 24 x 40-foot core room.

CAMDEN, N. J.—The city has awarded the general contract for a 2-story, 27 x 112-foot machine shop to cost $10,000, to James W. Draper, 436 Haddon avenue.

HARRISON, N. J.—The National Hoisting Engine Co. has let the general contract for a machine shop addition to E. M. Waldron, Inc., 665 Broad street, Newark.

KEARNY, N. J.—The Ford Motor Co. has had plans drawn for a 300 x 500-foot, 4-story plant to be used as an assembling plant. Gaston Plaintiff and Eber C. Sherman, 17 Battery Place, New York, are interested.

MANASQUAN, N. J.—The Imperial Porcelain Co., B. B. Dinsmore, 418 Greenwood avenue, Trenton, N. J., president has let a contract for three 1-story factory buildings to cost about $60,000.

NEWARK, N. J. — The Crocker-Wheeler Co., Twelfth street and Fourth avenue, will build a 5-story, 100 x 200-foot concrete storage and factory building to cost $163,000.

TRENTON, N. J.—The Holland Co., Brunswick avenue, has let a contract for the erection of two brick and steel factory buildings to cost $8000.

WEST HOBOKEN, N. J. — The Seton Chemical Co. has been organized with $50,000 capital to manufacture chemicals. The incorporators are: A. Murray, E. Murray and E. Saling, all of Newark.

DOVER, DEL.—The Wilbur Mfg. Co. has been chartered with $200,000 capital to make attachments for internal combustion engines. G. Grant Wright, J. Duke and B. Wright, Montclair, N. J., are the incorporators.

DOVER, DEL.—The Kansas City Sheet Steel & Tube Co. has been chartered with $1,000,000 capital to make sheet metal and other products. F. A. Armstrong, W. S. Randall and C. M. Egner, Elkton, Md., are the incorporators.

BALTIMORE.—The government will erect 15 buildings, to cost about $100,000, here. The quartermaster at Fort Howard has charge.

RICHMOND, VA.—John B. Guernsey & Co., Richmond, have purchased the Graham blast furnace and plan to remodel and operate it as soon as possible.

Activities in the Central States

MILWAUKEE.—The Hydro-Hoist Co. has been incorporated with $25,000 capital by Cornelius Wolf, August Heinemann, and Frank A. Tuscher.

MILWAUKEE. — The Wisconsin Gear & Axle Co. has been incorporated with $100,000 capital to manufacture gears and tractor parts by Bernard A. Hoermann, Jacob Schamer and H. W. Noll, 1057 Muskego avenue.

MILWAUKEE. — The Fitzsimmons Steel Products Co., 548 Park street, has been granted a permit to build a new stockhouse, 53 x 119 feet, to cost $20,000. The Northwestern Bridge & Iron Co. is the general contractor.

MILWAUKEE. — Contracts have been awarded by the International Harvester Co. for the erection of a new $100,000 core building at its big Milwaukee plant at 748 Park street. It will be of reinforced concrete and brick, 80 x 240 feet in size. W. D. Price, 606 South Michigan avenue, Chicago, is superintendent of construction.

OSHKOSH, WIS. — The Hayes Machine Co. is being reorganized as the E. B. Hayes Axle Co. with $500,000 capital. A new plant is being built at Grand Rapids, Mich., where its works will be established.

RACINE, WIS.—The Hamilton-Beach Mfg. Co., electric appliances, is having plans prepared for a 3-story addition, 80 x 160 feet. A. L. Flegel, Racine, is the architect.

BENTON HARBOR, MICH.—The Benton Harbor Auto Machine Co. has been incorporated with $175,000 capital to take over the business of the Electric Specialties Mfg. Co.

and the Morrill & Morley Mfg. Co. J. M. Klock is president.

DETROIT.—The Gray Iron Castings Co., 247 Habaugh street, will build a plant 30 x 48 feet, to cost $10,000.

DETROIT.—The Anderson Forge & Machine Co., Jefferson street, will add to its forge and die shop. A. Kahn, 58 West Lafayette boulevard, is the architect.

FLINT, MICH.—An election will be held soon on issuing $128,000 in bonds for waterworks improvements. W. L. Fisher is superintendent.

IRONWOOD, MICH.—The city of Ironwood has voted to build a waterworks system. F. R. Blackhurst is superintendent.

LANSING, MICH. — The Lansing Screw Products Co. has been incorporated with $70,000 capital by Alfred Hermsdorf and others.

PORT HURON, MICH.—The Grand Trunk railroad, H. H. Mafford, chief engineer, Montreal, Que., is building a freight car repair shop 160 x 365 feet to cost $150,000.

SAGINAW, MICH.—Nelson Bros., Morse & Owen streets, will build a plant for the manufacture of tractors.

CHICAGO.—The Goldsmith Bros. Smelting & Refining Co., Fifty-ninth and Throop streets, will build a plant. M. Goldsmith, 5844 Thropp street, is general manager.

CHICAGO.—H. G. Lang, 162 North May street, will build a foundry 75 x 100 feet at Fulton and Curtis streets to cost $15,000. R. T. Newberry, 208 South La Salle street, is architect.

CHICAGO.—The Union Specialty Machine Co., 300 West Kinzie street, is having plans drawn for an 8-story factory building. G. C. Nimmons, 122 South Michigan avenue, is architect.

CHICAGO. — The Chicago, Burlington & Quincy railroad, Hale Holden, president, 547 West Jackson boulevard, will build a 1-story machine shop 41 x 121 feet costing $60,000 at Clyde station, Cicero, Ill.

CHICAGO.—The Motors Specialty Corp. has been incorporated in Delaware with $150,000 capital to manufacture carburetors and starters by Richard James and S. J. Blumenthal.

DECATUR, ILL.—The Mueller Mfg. Co., plumbers brass goods, will build a 1-story addition 50 x 150 feet to cost $20,000.

FRANKLIN PARK, ILL. — The Indiana Harbor Belt railroad is taking bids on a power house 38 x 62 feet to cost $20,000.

ANDERSON, IND.—The Roof Motor Specialty Co. has been incorporated with $50,000 capital to manufacture automobile specialties by W. N. Durbin, J. A. McMyler, and Robert M. Roof.

GARY, IND. — The International Airship Corp. is taking bids on a factory and power house to be 1-story, 100 x 500 feet and cost $200,000. The plant will be built at Miller, Indiana.

INDIANAPOLIS. — The Luther Roller Shovel Co. has been incorporated with $25,000 capital to manufacture machinery and shovels by C. J. Luther, Wasson, Ill., Louis N. Parish and Robert Hargis, Harrisburg, Ill.

BARBERTON, O.—S. W. Harris is interested in the company which lately started construction work on a $150,000 foundry.

CINCINNATI.—The Rudner Iron & Steel Co. has been incorporated with $50,000 capital by Charles S. Weinhaut, H. Berkman, Ben Rudner, Max Rudner and others.

CINCINNATI.—The Salem Brass & Bronze Co. has been chartered with $25,000 capital by C. J. Rath, J. M. Lyle, R. F. Fawcett, H. L. Bonsall and H. R. Kale.

CLEVELAND.—The Kilby Mfg. Co. has taken out a permit for a 35 x 160-foot factory addition to cost about $6000.

CLEVELAND. — The J. C. Ulmer Co. through the Poe Engineering Co. has filed plans for a 2-story, 51 x 105-foot machine shop.

CLEVELAND. — The National Acme Co. has taken title to a 1-acre tract on East 131st street, at which point it is building a large factory.

CLEVELAND.—Brennan & McBride have taken out a permit for a 2-story building, 50 x 120 feet, to cost $17,000. Part of the new building is to be utilized as a machine shop.

CLEVELAND.—The American Auto Trimming Co., Detroit, has purchased a 2-acre site on Taft avenue and is having plans prepared for a factory.

CLEVELAND. — The Cleveland Machine Tool Co. has been chartered with $200,000 capital by Frank S. Shields, James H. Whitelaw, Edgar A. Hahn, Maurice M. Murphy and V. Birchall.

CLEVELAND. — The National Lamp Co. through George H. Johnson, architect, has made application for a permit to erect a $160,000 warehouse and factory building, to be about 140 x 250 feet.

CLEVELAND. — The Watson Engineering Co. has filed plans for a portion of the freight terminal to be built for the Cleveland & Youngstown railroad. According to the plans the cost of the project will be $675,000.

CLEVELAND. — The National Malleable Castings Co. has awarded a contract to the F. W. Mark Construction Co. for a pattern shop, power house, boiler shop and machine shop, involving a total expenditure of $90,000.

Mississippi to the Rockies

ABILENE, TEX.—W. A. Riney is preparing plans for a city waterworks system to include about 16 miles of 24-inch concrete, and 6 miles of cast iron pipe. About $500,000 will be involved in the project.

ALTUS, OKLA.—The city is planning to issue $400,000 worth of bonds for waterworks construction.

CONDE, S. DAK.—S. W. Jonason & Co. have been awarded the contract for constructing the city hall, at the contract price of $19,845.

DALLAS, TEX.—E. B. Doggett, contemplates the construction of a 4-story, brick and concrete warehouse, to cost about $32,000.

ENID, OKLA.—The Geronimo Motor Co. is planning to build a malleable foundry using gas fuel.

IDAHO FALLS, IDAHO.—The East Idaho Gas Co., W. D. Wilcox, president, plans the expenditure of $60,000 in erecting a gas plant in this city.

HAMILTON, MO.—Bids will be received until Sept. 17 by O. G. Matthews, clerk, for a waterworks system, to cost about $30,000. E. T. Arthur & Co., Kansas City, Mo., are engineers.

INDEX, ARK. — The board of commissioners will receive bids until Oct. 4 on a 6-span, steel bridge, 1890 feet long, to cost about $260,000.

KASSON, MINN.—Bids are being received for the construction of a high school building to cost about $75,000. N. E. Beard is clerk of the school board.

LAWTON, OKLA.—A contract has been awarded to the N. S. Sherman Machine & Iron Works, Oklahoma City, for improvements to the waterworks system. The city has issued $375,000 worth of bonds.

MINNEAPOLIS. — The Perfection Mfg. Co., Joseph Nurok, general manager, 3600 East Twenty-sixth street, will build a 2-story factory 40 x 190 feet in the Minneapolis industrial street.

OWATONNA, MINN. — A high school building to cost about $150,000 will be built. Bids are being taken by John W. Dinsmore, clerk of the school board. Nels Jacobson is the architect.

POPLAR, MONT.—The city of Poplar will build a waterworks system costing $25,000.

POTEAU, OKLA.—Contracts have been let to the Kansas City Bridge Co. for two steel bridges to cost $24,000.

TEXARKANA, ARK.—The Williams Mill Mfg. Co. has been incorporated with $150,000 capital stock by M. Sedberry, H. M. Barney and James Sedberry.

WATERLOO, IOWA.—The Waterloo Engineering Co. is planning to build a foundry 150 x 600 feet to cost $200,000.

WYNNE, ARK.—The city of Wynne has let a contract to the Larimer & Burget Bridge Co., Memphis, Tenn., for a steel bridge to cost $33,560.

The Pacific Coast States

EVERETT, WASH.—The city has secured a 100-acre site at Horse Shoe bend on the Sultan river for a power plant.

OLYMPIA, WASH.—The city is having plans prepared for a 3-story, brick high school building which will cost about $100,000. Heath & Gove, Tacoma, are the architects.

SEATTLE.—The Puget Sound Traction & Power Co. will build a coal handling plant, 44 x 120 feet, to cost about $25,000.

SEATTLE.—The Linde Air Products Co., 530 First avenue, has obtained a permit to erect a $60,000 gas plant at 701 Henrietta street. The Sound Construction & Engineering Co., 72 Union street, is the builder.

SEATTLE.—The Olympic Steel Works has completed plans for the construction of a 1-story, 72 x 102-foot frame addition to its plant at 111 Horton street.

SEATTLE.—H. M. Rothweiler is planning the erection of a 1-story screw, nut and bolt factory 40 x 135 feet.

SEATTLE. — The Markey Campbell Machinery Co., Hanford and Waterway streets, is building a machine shop 65 x 100 feet.

SEATTLE. — The Erickson Engineering Co. has been incorporated with $2,100,000 capital to build ships, by C. J. Erickson, C. E. Erickson and Charles M. Burnett.

SEATTLE.—Permission has been granted railroads centering in Seattle and jointly interested in constructing the east marginal way spur to extend the line about 1½ miles south of the city to open a factory site.

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports.

Old range Bessemer, 55 iron	5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

Port Henry Ores, non-Bessemer, Per Unit, Delivered Eastern Pennsylvania.

Old Bed, crude 55 iron	10.50c to 11.00c
Old Bed., concent., 65 iron	11.00c to 11.50c
Harmony, concent., 63 iron	11.50c to 11.75c
Lump (at mines)	$5.75

WAREHOUSE PRICES

Steel bars, Chicago	4.50c
Steel bars, Cleveland	4.50c to 5.00c
Steel bars, Detroit	4.50c
Steel bars, Philadelphia	5.00c to 5.50c
Steel bars, New York	4.75c to 5.00c
Steel bars, St. Louis	4.55c
Steel bars, Cincinnati	**5.00c**
Steel bars, St. Paul	4.60c
Steel bars, Buffalo	4.60c to 5.10c
Iron bars, Chicago	4.50c
Iron bars, Cleveland	4.45c to 4.95c
Iron bars, Detroit	4.50c
Iron bars, St Louis	4.45c
Iron bars, Cincinnati	**5.00c**
Iron bars, Philadelphia	5.20c
Iron bars, New York	5.00c
Shapes, Chicago	5.00c
Shapes, Detroit	5.00c
Shapes, St. Louis	5.05c
Shapes, St. Paul	5.10c
Shapes, New York	5.00c to 5.25c
Shapes, Cleveland	5.00c to 5.25c
Shapes, Philadelphia	5.00c to 5.50c
Shapes, Buffalo	5.10c to 5.35c
Shapes, Cincinnati	**5.25c**
Plates, Chicago	7.00c to 10.00c
Plates, Detroit	**9.00c to 10.00c**
Plates, St. Louis	7.05c to 7.55c
Plates, St. Paul	**7.10c**
Plates, New York	8.00c to 9.00c
Plates, Cleveland	9.00c to 10.00c
Plates, Philadelphia	10.00c
Plates, Cincinnati	10.00c
No. 10 blue anl. sheets, Chi.	9.50c to 10.00c
No. 10 blue anl. sheets, Cleve.	9.00c
No. 10 blue anl., Buffalo	11.00c to 11.75c
No. 10 blue anl., sheets, St. L.	10.05c
No. 10 blue anl. sheets, Cinci.	10.00c
No. 10 blue anl. sheets, St. Paul	9.60c
No. 10 blue anl. sh., Detroit	9.50c
No. 28 black sheets, Chgo.	9.50c to 10.00c
No. 28 black sheets, Cleve.	9.00c
No. 28 black sheets, Cincin.	8.65c
No. 28 black, Detroit	**9.50c**
No. 28 black sheets, St. L.	10.35c
No. 28 black sheets, St. Paul	9.60c
No. 28 galv. sheets, Chgo.	11.00c to 11.50c
No. 28 galv. sheets, Cleve.	10.75c
No. 28 galv. sheets, Cincin.	10.65c
No. 28 galvanized, Detroit	11.00c
No. 28 galv. sheets, St. L.	11.5½c to 11.75c
Hoops, Cleveland	6.00c
Hoops, Detroit	**7.00c**

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	$25.00 to 27.00
Bundled sheets, Cleveland	25.50 to 26.00
Bundled sheets, Buffalo	20.00 to 21.00
City wrought, short, N. Y.	27.00 to 28.00
Frogs, switches, guards, St. L.	32.00 to 33.00
Heavy melting steel, Pitts.	36.00 to 38.00
Heavy melting steel, Buffalo	31.50 to 32.00
Heavy melting steel, Chgo.	33.00 to 34.00
Heavy melt'g steel, Cleveland	33.00 to 34.00
Heavy melting steel, Cinci.	30.00 to 30.50
Heavy melting steel, east. Pa.	30.00 to 31.00
Heavy melting steel, N. Y.	27.00 to 28.00
Heavy melting steel, St. L.	34.00 to 35.00
Heavy melting steel, Birming.	20.50 to 21.50
Hydraulic pressed sh'ts, Cleve.	29.00
Hydraulic press. sheets, Pitts.	31.00 to 32.00
Hydraulic pressed sh'ts, Chgo.	26.00 to 27.00
Low phos. steel, Buffalo	41.00 to 42.00
Low phos. steel, Pittsburgh	48.00 to 49.00
Low phos. steel, eastern Pa.	40.00 to 45.00
Shoveling steel, Chicago	30.50 to 31.50
Shoveling steel, St. Louis	31.00 to 32.00
Steel rails, short, Chicago	39.00 to 40.00
Steel rails, short, Cleveland	35.00 to 36.00
Steel rails, short, St. Louis	42.00 to 43.00
Steel rails, old, Birmingham	24.00 to 25.00
Stove plate, Cincinnati	17.50 to 18.00
Stove plate, St. Louis	17.00 to 17.50
Stove plate, N. J. points	20.00
Stove plate, Birmingham	18.00 to 19.00
Stove plate, Buffalo	21.00 to 22.00
Stove plate, eastern Pa.	21.00 to 22.00
Stove plate, Pittsburgh	23.00 to 23.50

(Net Tons)

Boiler plate, cut, No. 1, Chgo.	$20.00 to 21.00
Boiler plate, cut, No. 1, St. L.	19.50 to 20.00
Bundled sheets, Cincinnati	17.50 to 18.00
Knuckles, coup., Chicago	37.00 to 38.00
Knuckles, coup., St. Louis	41.00 to 42.00
Springs, Chicago	43.00 to 44.00
Stove plate, Chicago	18.00 to 19.00
Stove plate, Cleveland	21.00 to 22.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:

Cleveland	$0.95
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54

Buffalo to:

Albany, N. Y.	$1.26
New England (rail)	3.10
New York and Brooklyn (rail)	3.10

Virginia furnaces to:

Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88

Birmingham, Ala., to:

Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	4.25
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40

Chicago to:

Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54

Duluth, Minn., to:

Minneapolis-St. Paul	$1.25

Mayville, Wis.:

Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:	
New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	11.6 cents
Baltimore	18.0 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	76.1 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama	61.0 cents

IRON MILL USE

(Gross Tons)

Busheling, No. 1, Buffalo	28.00 to 29.00
Busheling, No. 2, Buffalo	18.00 to 19.00
Busheling, No. 1, Pittsburgh	25.00 to 27.00
Cast borings, New York	18.50 to 19.00
Cast borings, eastern Pa.	21.00 to 22.00
Cast borings, Buffalo	20.00 to 21.00
Cast borings, Pittsburgh	23.50 to 24.50
City wrought, long, N. Y.	31.00 to 32.00
Forge flashings, small, Cleve.	27.00 to 28.00
Forge flashings, large, Cleve.	25.00 to 26.00
Forge, No. 1, eastern Pa.	21.50 to 22.50
Grate bars, Buffalo	20.00 to 21.00
Grate bars, N. J. points	19.00
Iron axles, Pittsburgh	50.00 to 52.00
Iron axles, Cincinnati	44.00 to 44.50
Iron axles, eastern Pa.	50.00 to 55.00
Iron axles, Buffalo	45.00 to 47.00
Iron rails, Chicago	42.00 to 43.00
Iron rails, Buffalo	43.00 to 44.00
Iron rails, Cincinnati	34.50 to 35.00
Iron rails, St. Louis	43.00 to 44.00
Iron rails, Cleveland	42.50 to 43.50
Machine turnings, Buffalo	$18.00 to 19.00
Machine shop turnings, N. Y.	19.00 to 19.50
Mach. shop turnings, Pitts.	23.00 to 23.50
Mch. shop turnings, east. Pa.	19.00
Machine turnings, Birming.	11.00 to 12.00
R. R. mch. cast, No. 1, Buff.	30.00 to 31.00
R. R. wrought, 1, Buffalo	43.00 to 44.00
R. R. wrgt., No. 1, east. Pa.	43.00 to 47.00
R. R. wrought, No. 1, Pitts.	43.00 to 44.00
R. R. wrought, 1, B'ham	26.00 to 27.00
Wrought pipe, Buffalo	28.00 to 29.00
Wrought pipe, eastern Pa.	29.00 to 30.00
Wrought pipe, New York	27.00 to 28.00

(Net Tons)

Angle bars, iron, Chicago	$44.50 to 45.00
Angle bars, steel, St. Louis	31.00 to 32.00
Arch bars & transoms, St. L.	43.00 to 44.00
Arch bars & transoms, Chgo.	45.00 to 46.00
Busheling, No. 1, Chicago	25.50 to 26.50
Busheling, No. 1, Cincinnati	21.50 to 22.00
Busheling, No. 1, Cleveland	27.00 to 28.00
Busheling, No. 1, St. Louis	24.50 to 25.00
Busheling, No. 2, Chicago	18.50 to 19.00
Cast borings, Cincinnati	14.50 to 15.00
Cast borings, Cleveland	18.50 to 19.50
Cast borings, St. Louis	16.00 to 17.00
Cast borings, Chicago	16.00 to 17.00
Cut forge, Chicago	32.00 to 33.00
Grate bars, Cleveland	21.50 to 22.50
Iron axles, St. Louis	45.00 to 46.00
Iron axles, Chicago	45.00 to 46.00
Iron axles, Cleveland	46.50 to 47.00
Machine shop turnings, Chgo.	16.50 to 17.50
Mach. shop turnings, Cleve.	18.00 to 18.50
Machine shop turn'gs, Cinci.	14.50 to 15.00
Mach. shop turnings, St. L.	18.00 to 18.50
Pipes and flues, Cleveland	23.50 to 24.00
Pipes and flues, Chicago	24.00 to 25.00
Pipes and flues, St. Louis	20.50 to 21.00
Railroad wrought, 1, Cleve.	40.50 to 41.50
Railroad wrgt., No. 1, Chgo.	36.00 to 36.50
Railroad wrought, 1, Cinci.	33.00 to 34.00
Railroad wrought, 1, St. L.	36.00 to 37.00
Railroad wrgt., No. 2, Chgo.	33.00 to 34.00
Railroad wrought, 2, St. L.	34.00 to 35.00

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	$26.00 to 27.00
Axle turnings, Buffalo	26.00 to 27.00
Shafting, New York	37.00 to 38.00
Shafting, eastern Pa.	40.00 to 43.00
Steel car axles, Birmingham	32.00 to 33.00
Steel car axles, New York	47.00 to 48.00
Steel car axles, Buffalo	45.00 to 47.00
Steel car axles, Cleveland	50.50 to 51.50
Steel car axles, Pittsburgh	50.00 to 52.00
Steel car axles, eastern Pa.	50.00 to 55.00

(Net Tons)

Shafting, St. Louis	42.00 to 43.00
Steel car axles, St. Louis	41.00 to 42.00
Steel car axles, Chicago	43.00 to 44.00

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pitts.	$36.00 to 37.00
Car wheels, (steel), Pitts.	45.00 to 46.00
Car wheels, Chicago	31.00 to 33.00
Car wheels, eastern Pa.	36.00 to 38.00
Car wheels, Buffalo	35.00 to 36.00
Car wheels, New York	32.00 to 33.00
Car wheels, St. Louis	33.00 to 34.00
Car wheels, Birmingham	23.00 to 24.00
Car wheels, Cleveland	30.50 to 31.50
Tram car wheels, Birming.	20.00 to 21.00
Cast, No. 1, Birmingham	23.50 to 24.50
Cast, 1, machy., N. J. points	34.00 to 35.00
Cast, 1, heavy, N. J. points	32.00 to 33.00
Cast, No. 1, eastern Pa.	33.00 to 34.00
Cast, No. 1, Pittsburgh	34.00 to 35.00
Malleable railroad, Cincinnati	26.00 to 26.50
Malleable railroad, Cleveland	32.00 to 33.00
Malleable railroad, Buffalo	32.00 to 33.00
Malleable railroad, Pittsburgh	31.00 to 33.00
Malleable railroad, east. Pa.	32.00 to 34.00

(Net Tons)

Cast No. 1, Cleveland	27.00 to 28.00
Cast, No. 1, Chicago	25.00 to 26.00
Cast, No. 1, Cincinnati	23.00 to 23.50
Cast, No. 1, St. Louis	25.00 to 26.00
Malleable railroad, Chicago	32.50 to 33.50
Malleable railroad, St. Louis	31.00 to 32.00
Malleable agricultural, Chgo.	25.50 to 26.50

MISCELLANEOUS USES

(Gross Tons)

Reroll. rails, 5 ft. & ov., Pitts.	$45.00
Reroll. rails, 5 ft. & ov., Chgo.	41.00 to 42.00
Reroll. rails, 5 ft. & ov., E. Pa.	43.00 to 45.00
Reroll. rails, 5 ft. & ov., St. L.	44.00 to 45.00
Reroll. rails, 5 ft. or ov., Cleve.	42.00 to 43.00
Rerolling rails, long, Birming.	37.50 to 38.50

(Net Tons)

Boiler punchings, Chicago	35.00 to 36.00
Locomotive tires, Chicago	42.00 to 43.00
Locomotive tires, St. Louis	46.00 to 47.00